

CPC COOPERATIVE PATENT CLASSIFICATION

G PHYSICS (NOTES omitted)

INSTRUMENTS

G06 **COMPUTING; CALCULATING; COUNTING** (score computers for games [A63B 71/06](#), [A63D 15/20](#), [A63F 1/18](#); combinations of writing implements with computing devices [B43K 29/08](#))
(NOTES omitted)

G06F **ELECTRIC DIGITAL DATA PROCESSING** (computer systems based on specific computational models [G06N](#))

NOTE

In this subclass, the following terms or expressions are used with the meaning indicated:

- "handling" includes processing or transporting of data;
- "data processing equipment" means an association of an electric digital data processor classifiable under group [G06F 7/00](#), with one or more arrangements classifiable under groups [G06F 1/00](#) - [G06F 5/00](#) and [G06F 9/00](#) - [G06F 13/00](#).

WARNINGS

- The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

G06F 3/18	covered by	G06F 3/00 , G06K 11/00
G06F 7/04	covered by	G06F 7/02
G06F 9/302 - G06F 9/318	covered by	G06F 9/30
- In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

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|---------------|---|---------------|---|
| 1/00 | Details not covered by groups G06F 3/00 – G06F 13/00 and G06F 21/00 (architectures of general purpose stored program computers G06F 15/76) | 1/0321 | . . . {Waveform generators, i.e. devices for generating periodical functions of time, e.g. direct digital synthesizers (G06F 1/0314 , G06F 1/035 take precedence)} |
| 1/02 | . Digital function generators {(evaluating functions by calculating only G06F 7/544 , G06F 7/60 ; generating sawtooth or staircase waveforms H03K 4/00)} | 1/0328 | . . . {in which the phase increment is adjustable, e.g. by using an adder-accumulator} |
| 1/022 | . . {Waveform generators, i.e. devices for generating periodical functions of time, e.g. direct digital synthesizers (G06F 1/025 , G06F 1/03 take precedence)} | 1/0335 | . . . {the phase increment itself being a composed function of two or more variables, e.g. frequency and phase} |
| 1/025 | . . for functions having two-valued amplitude, e.g. Walsh functions {(generation of pulse trains in general H03K 3/00)} | 1/0342 | . . . {for generating simultaneously two or more related waveforms, e.g. with different phase angles only} |
| 1/0255 | . . . {Walsh or analogous functions} | 1/035 | . . . Reduction of table size {(G06F 1/0314 takes precedence)} |
| 1/03 | . . working, at least partly, by table look-up (G06F 1/025 takes precedence) | 1/0353 | . . . {by using symmetrical properties of the function, e.g. using most significant bits for quadrant control} |
| | <u>NOTE</u> | 1/0356 | . . . {by using two or more smaller tables, e.g. addressed by parts of the argument} |
| | In order to be classified in this group, the table must contain function values of the desired or an intermediate function, not merely coefficients. | 1/04 | . Generating or distributing clock signals or signals derived directly therefrom |
| 1/0307 | . . . {Logarithmic or exponential functions (G06F 1/0314 , G06F 1/035 take precedence)} | 1/06 | . . Clock generators producing several clock signals {(G06F 1/08 - G06F 1/14 take precedence)} |
| 1/0314 | . . . {the table being stored on a peripheral device, e.g. papertape, drum} | 1/08 | . . Clock generators with changeable or programmable clock frequency |
| | | 1/10 | . . Distribution of clock signals {, e.g. skew} |
| | | 1/105 | . . . {in which the distribution is at least partially optical} |
| | | 1/12 | . . Synchronisation of different clock signals {provided by a plurality of clock generators} |

- 1/14 . . Time supervision arrangements, e.g. real time clock
- 1/16 . Constructional details or arrangements
- 1/1601 . . {Constructional details related to the housing of computer displays, e.g. of CRT monitors, of flat displays (constructional details related to flat displays integrated in a portable computer, e.g. laptop, handheld computer [G06F 1/1637](#); constructional details related to television receivers [H04N 5/64](#))}
- 1/1603 . . . {Arrangements to protect the display from incident light, e.g. hoods}
- 1/1605 . . . {Multimedia displays, e.g. with integrated or attached speakers, cameras, microphones}
- 1/1607 . . . {Arrangements to support accessories mechanically attached to the display housing ([G06F 1/1603](#), [G06F 1/1605](#) take precedence)}
- 1/1609 {to support filters or lenses}
- 1/1611 {to support document holders}
- 1/1613 . . {for portable computers (cooling arrangements therefor [G06F 1/203](#); constructional details or arrangements for pocket calculators, electronic agendas or books [G06F 15/0216](#); constructional details of portable telephone sets: with several bodies [H04M 1/0202](#))}
- 1/1615 . . . {with several enclosures having relative motions, each enclosure supporting at least one I/O or computing function (constructional details of portable telephones comprising a plurality of mechanically joined movable body parts [H04M 1/0206](#))}
- 1/1616 {with folding flat displays, e.g. laptop computers or notebooks having a clamshell configuration, with body parts pivoting to an open position around an axis parallel to the plane they define in closed position}
- 1/1618 {the display being foldable up to the back of the other housing with a single degree of freedom, e.g. by 360° rotation over the axis defined by the rear edge of the base enclosure}
- 1/162 {changing, e.g. reversing, the face orientation of the screen with a two degrees of freedom mechanism, e.g. for folding into tablet PC like position or orienting towards the direction opposite to the user to show to a second user}
- 1/1622 {with enclosures rotating around an axis perpendicular to the plane they define or with ball-joint coupling, e.g. PDA with display enclosure orientation changeable between portrait and landscape by rotation with respect to a coplanar body enclosure}
- 1/1624 {with sliding enclosures, e.g. sliding keyboard or display}
- 1/1626 . . . {with a single-body enclosure integrating a flat display, e.g. Personal Digital Assistants [PDAs]}
- 1/1628 . . . {Carrying enclosures containing additional elements, e.g. case for a laptop and a printer}
- 1/163 . . . {Wearable computers, e.g. on a belt}
- 1/1632 . . . {External expansion units, e.g. docking stations}
- 1/1633 {Constructional details or arrangements of portable computers not specific to the type of enclosures covered by groups [G06F 1/1615](#) - [G06F 1/1626](#)}
- 1/1635 {Details related to the integration of battery packs and other power supplies such as fuel cells or integrated AC adapter (details of mounting batteries in general [H01M 2/1022](#))}
- 1/1637 {Details related to the display arrangement, including those related to the mounting of the display in the housing (constructional details related to the housing of computer displays in general [G06F 1/1601](#))}
- 1/1639 {the display being based on projection}
- 1/1641 {the display being formed by a plurality of foldable display components ([G06F 1/1647](#) takes precedence)}
- 1/1643 {the display being associated to a digitizer, e.g. laptops that can be used as penpads (touchpads integrated in a laptop or similar computer [G06F 1/169](#); secondary touch screen [G06F 1/1692](#); details related to the relative motion of the display enclosure with respect to the body enclosure, e.g. to move between laptop and tablet PC configuration [G06F 1/1615](#))}
- 1/1645 {the display being suitable to be used in combination with an external overhead projector}
- 1/1647 {including at least an additional display ([G06F 1/1692](#) takes precedence)}
- 1/1649 {the additional display being independently orientable, e.g. for presenting information to a second user}
- 1/165 {the additional display being small, e.g. for presenting status information}
- 1/1652 {the display being flexible, e.g. mimicking a sheet of paper, or rollable}
- 1/1654 {the display being detachable, e.g. for remote use}
- 1/1656 {Details related to functional adaptations of the enclosure, e.g. to provide protection against EMI, shock, water, or to host detachable peripherals like a mouse or removable expansions units like PCMCIA cards, or to provide access to internal components for maintenance or to removable storage supports like CDs or DVDs, or to mechanically mount accessories (mounting of accessories to a computer display [G06F 1/1607](#); display hoods [G06F 1/1603](#); cooling arrangements for portable computers [G06F 1/203](#))}
- 1/1658 {related to the mounting of internal components, e.g. disc drive or any other functional module}
- 1/166 {related to integrated arrangements for adjusting the position of the main body with respect to the supporting surface, e.g. legs for adjusting the tilt angle}
- 1/1662 {Details related to the integrated keyboard}
- 1/1664 {Arrangements for ergonomically adjusting the disposition of keys of the integrated keyboard}

- 1/1666 {Arrangements for reducing the size of the integrated keyboard for transport, e.g. foldable keyboards, keyboards with collapsible keys ([G06F 1/1664 takes precedence](#))}
- 1/1667 {Arrangements for adjusting the tilt angle of the integrated keyboard independently from the main body ([adjusting the tilt angle integrally with the main body G06F 1/166](#))}
- 1/1669 {Detachable keyboards}
- 1/1671 {Special purpose buttons or auxiliary keyboards, e.g. retractable mini keypads, keypads or buttons that remain accessible at closed laptop ([G06F 1/1666 takes precedence](#))}
- 1/1673 {Arrangements for projecting a virtual keyboard}
- 1/1675 {Miscellaneous details related to the relative movement between the different enclosures or enclosure parts which could be adopted independently from the movement typologies specified in [G06F 1/1615](#) and subgroups}
- 1/1677 {for detecting open or closed state or particular intermediate positions assumed by movable parts of the enclosure, e.g. detection of display lid position with respect to main body in a laptop, detection of opening of the cover of battery compartment}
- 1/1679 {for locking or maintaining the movable parts of the enclosure in a fixed position, e.g. latching mechanism at the edge of the display in a laptop or for the screen protective cover of a PDA ([G06F 1/1681 takes precedence](#))}
- 1/1681 {Details related solely to hinges ([hinge details related to the transmission of signals or power are classified in G06F 1/1683](#))}
- 1/1683 {for the transmission of signal or power between the different housings, e.g. details of wired or wireless communication, passage of cabling}
- 1/1684 {Constructional details or arrangements related to integrated I/O peripherals not covered by groups [G06F 1/1635 - G06F 1/1675](#)}
- 1/1686 {the I/O peripheral being an integrated camera}
- 1/1688 {the I/O peripheral being integrated loudspeakers}
- 1/169 {the I/O peripheral being an integrated pointing device, e.g. trackball in the palm rest area, mini-joystick integrated between keyboard keys, touch pads or touch stripes ([G06F 1/1643 takes precedence; constructional details of pointing devices G06F 3/033; joysticks in general G05G 9/047](#))}
- 1/1692 {the I/O peripheral being a secondary touch screen used as control interface, e.g. virtual buttons or sliders}
- 1/1694 {the I/O peripheral being a single or a set of motion sensors for pointer control or gesture input obtained by sensing movements of the portable computer}
- 1/1696 {the I/O peripheral being a printing or scanning device}
- 1/1698 {the I/O peripheral being a sending/receiving arrangement to establish a cordless communication link, e.g. radio or infrared link, integrated cellular phone ([details of antennas disposed inside a computer H01Q 1/2266](#))}
- 1/18 Packaging or power distribution ([for electrical apparatus in general H05K, H02J](#))}
- 1/181 {Enclosures ([for electric apparatus in general H05K 5/00; for portable computers G06F 1/1613](#))}
- 1/182 {with special features, e.g. for use in industrial environments; grounding or shielding against radio frequency interference [RFI] or electromagnetic interference [EMI] ([in general H05K 9/00](#))}
- 1/183 {Internal mounting support structures, e.g. for printed circuit boards ([in general H05K 7/1422](#)), internal connecting means ([for buses G06F 13/409](#))}
- 1/184 {Mounting of motherboards ([in general H05K 7/1429](#))}
- 1/185 {Mounting of expansion boards ([in general H05K 7/1417](#))}
- 1/186 {Securing of expansion boards in correspondence to slots provided at the computer enclosure ([in general H05K 7/1402](#))}
- 1/187 {Mounting of fixed and removable disk drives ([constructional details of disk drives housings in general G11B 33/00](#))}
- 1/188 {Mounting of power supply units ([power supply for computers, per se G06F 1/26](#))}
- 1/189 {Power distribution}
- 1/20 Cooling means
- 1/203 {for portable computers, e.g. for laptops}
- 1/206 {comprising thermal management}
- 1/22 Means for limiting or controlling the pin/gate ratio
- 1/24 Resetting means
- 1/26 Power supply means, e.g. regulation thereof ([for memories G11C](#))}
- 1/263 {Arrangements for using multiple switchable power supplies, e.g. battery and AC ([G06F 1/30 takes precedence](#))}
- 1/266 {Arrangements to supply power to external peripherals either directly from the computer or under computer control, e.g. supply of power through the communication port, computer controlled power-strips}
- 1/28 Supervision thereof, e.g. detecting power-supply failure by out of limits supervision
- 1/30 Means for acting in the event of power-supply failure or interruption, e.g. power-supply fluctuations ([for resetting only G06F 1/24](#))}
- 1/305 {in the event of power-supply fluctuations}
- 1/32 Means for saving power
- 1/3203 Power management, i.e. event-based initiation of power-saving mode

- 1/3206 Monitoring of events, devices or parameters that trigger a change in power modality
- 1/3209 Monitoring remote activity, e.g. over telephone lines or network connections
- 1/3212 Monitoring battery levels, e.g. power saving mode being initiated when battery voltage goes below a certain level
- 1/3215 Monitoring of peripheral devices
- 1/3218 of display devices
- 1/3221 of disk drive devices
- 1/3225 of memory devices
- 1/3228 Monitoring task completion, e.g. by use of idle timers, stop commands or wait commands
- 1/3231 Monitoring the presence, absence or movement of users
- 1/3234 Power saving characterised by the action undertaken
- 1/3237 by disabling clock generation or distribution
- 1/324 by lowering clock frequency
- 1/3243 {Power saving in microcontroller unit}
- 1/3246 by software initiated power-off
- 1/325 {Power saving in peripheral device}
- 1/3253 {Power saving in bus}
- 1/3256 {Power saving in optical drive}
- 1/3259 {Power saving in cursor control device, e.g. mouse, joystick, trackball}
- 1/3262 {Power saving in digitizer or tablet}
- 1/3265 {Power saving in display device}
- 1/3268 {Power saving in hard disk drive}
- 1/3271 {Power saving in keyboard}
- 1/3275 {Power saving in memory, e.g. RAM, cache}
- 1/3278 {Power saving in modem or I/O interface}
- 1/3281 {Power saving in PCMCIA card}
- 1/3284 {Power saving in printer}
- 1/3287 by switching off individual functional units in the computer system
- 1/329 by task scheduling
- 1/3293 by switching to a less power-consuming processor, e.g. sub-CPU
- 1/3296 by lowering the supply or operating voltage
- 3/00** **Input arrangements for transferring data to be processed into a form capable of being handled by the computer; Output arrangements for transferring data from processing unit to output unit, e.g. interface arrangements (typewriters [B41J](#); conversion of physical variables [F15B 5/00](#), [G01](#); image acquisition [G06T 1/00](#), [G06F 9/00](#); coding, decoding or code conversion in general [H03M](#); transmission of digital information [H04L](#); [in regulating or control systems [G05B](#)])**
- 3/002 . {Specific input/output arrangements not covered by [G06F 3/02 - G06F 3/16](#), e.g. facsimile, microfilm (facsimile [per se](#) [H04N 1/00](#); viewers photographic printing [G03B](#); electrography, magnetography [G03G](#); other optical apparatus [G02B 27/00](#))}
- 3/005 . . {Input arrangements through a video camera}
- 3/007 . {Digital input from or digital output to memories of the shift register type, e.g. magnetic bubble memories, CCD memories (magnetic bubble memories [per se](#) [G11C 19/08](#), CCD memories [per se](#) [G11C 19/28](#))}
- 3/01 . Input arrangements or combined input and output arrangements for interaction between user and computer ([G06F 3/16](#) takes precedence)
- 3/011 . . {Arrangements for interaction with the human body, e.g. for user immersion in virtual reality (for handicapped people in general [A61F 4/00](#); robot control [B25J](#); tactile signalling [G08B](#); blind teaching [G09B 21/00](#); for electrophonic musical instruments [G10H 1/344](#); electronic switches characterised by the way in which the control signals are generated [H03K 17/94](#))}
- 3/012 . . . {Head tracking input arrangements}
- 3/013 . . . {Eye tracking input arrangements ([G06F 3/015](#) takes precedence)}
- 3/014 . . . {Hand-worn input/output arrangements, e.g. data gloves}
- 3/015 . . . {Input arrangements based on nervous system activity detection, e.g. brain waves [EEG] detection, electromyograms [EMG] detection, electrodermal response detection}
- 3/016 . . {Input arrangements with force or tactile feedback as computer generated output to the user}
- 3/017 . . {Gesture based interaction, e.g. based on a set of recognized hand gestures (interaction based on gestures traced on a digitiser [G06F 3/04883](#))}
- 3/018 . . {Input/output arrangements for oriental characters}
- 3/02 . . Input arrangements using manually operated switches, e.g. using keyboards or dials (keyboard switches [per se](#) [H01H 13/70](#); electronic switches characterised by the way in which the control signals are generated [H03K 17/94](#))}
- 3/0202 . . . {Constructional details or processes of manufacture of the input device}
- 3/0205 {Lever arrangements for operating keyboard cursor control keys in a joystick-like manner}
- 3/0208 {Arrangements for adjusting the tilt angle of a keyboard, e.g. pivoting legs (for keyboards integrated in a laptop computer [G06F 1/1667](#))}
- 3/021 {Arrangements integrating additional peripherals in a keyboard, e.g. card or barcode reader, optical scanner}
- 3/0213 {Arrangements providing an integrated pointing device in a keyboard, e.g. trackball, mini-joystick (for pointing devices integrated in a laptop computer [G06F 1/169](#); joysticks [G05G 9/047](#); constructional details of pointing devices [G06F 3/033](#))}
- 3/0216 {Arrangements for ergonomically adjusting the disposition of keys of a keyboard (for keyboards integrated in a laptop computer [G06F 1/1664](#))}
- 3/0219 {Special purpose keyboards}

- 3/0221 {Arrangements for reducing keyboard size for transport or storage, e.g. foldable keyboards, keyboards with collapsible keys ([G06F 3/0216](#) takes precedence; for keyboards integrated in a laptop computer [G06F 1/1666](#))}
- 3/0224 {Key guide holders}
- 3/0227 . . . {Cooperation and interconnection of the input arrangement with other functional units of a computer ([G06F 3/023](#) - [G06F 3/037](#) take precedence)}
- 3/023 . . . Arrangements for converting discrete items of information into a coded form, e.g. arrangements for interpreting keyboard generated codes as alphanumeric codes, operand codes or instruction codes {(coding in connection with keyboards or like devices in general [H03M 11/00](#))}
- 3/0231 {Cordless keyboards}
- 3/0232 {Manual direct entries, e.g. key to main memory}
- 3/0233 {Character input methods}
- 3/0234 {using switches operable in different directions}
- 3/0235 {using chord techniques ([G06F 3/0234](#) takes precedence)}
- 3/0236 {using selection techniques to select from displayed items}
- 3/0237 {using prediction or retrieval techniques}
- 3/0238 {Programmable keyboards (key guide holders [G06F 3/0224](#))}
- 3/027 for insertion of decimal point {(display of decimal point [G06F 3/1407](#); complete desk-top or hand- held calculators [G06F 15/02](#))}
- 3/03 . . Arrangements for converting the position or the displacement of a member into a coded form
- NOTE**
- In this group, the first place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the first appropriate place.
- 3/0304 . . . {Detection arrangements using opto-electronic means (constructional details of pointing devices not related to the detection arrangement using opto-electronic means [G06F 3/033](#) and subgroups; optical digitisers [G06F 3/042](#))}
- 3/0308 {comprising a plurality of distinctive and separately oriented light emitters or reflectors associated to the pointing device, e.g. remote cursor controller with distinct and separately oriented LEDs at the tip whose radiations are captured by a photo-detector associated to the screen}
- 3/0312 {for tracking the rotation of a spherical or circular member, e.g. optical rotary encoders used in mice or trackballs using a tracking ball or in mouse scroll wheels (tracking relative movement in co-operation with a regularly or irregularly patterned surface, e.g. as in optical mice [G06F 3/0317](#); constructional details of scroll or thumb-wheels [G06F 3/0362](#); optical rotary encoders [G01D 5/3473](#); thumb wheel switches [H01H 19/001](#))}
- 3/0317 {in co-operation with a patterned surface, e.g. absolute position or relative movement detection for an optical mouse or pen positioned with respect to a coded surface}
- 3/0321 {by optically sensing the absolute position with respect to a regularly patterned surface forming a passive digitiser, e.g. pen optically detecting position indicative tags printed on a paper sheet (constructional details of pen-shaped pointing devices [G06F 3/03545](#), [G06F 3/03542](#), [G06F 3/037](#))}
- 3/0325 {using a plurality of light emitters or reflectors or a plurality of detectors forming a reference frame from which to derive the orientation of the object, e.g. by triangulation or on the basis of reference deformation in the picked up image}
- 3/033 . . . Pointing devices displaced or positioned by the user, e.g. mice, trackballs, pens or joysticks; Accessories therefor {(constructional details of joysticks [G05G 9/047](#); arrangement for interfacing a joystick to a computer [G06F 3/038](#))}
- 3/0334 {Foot operated pointing devices}
- 3/0338 with detection of limited linear or angular displacement of an operating part of the device from a neutral position, e.g. isotonic or isometric joysticks
- 3/0346 with detection of the device orientation or free movement in a 3D space, e.g. 3D mice, 6-DOF [six degrees of freedom] pointers using gyroscopes, accelerometers or tilt-sensors
- 3/0354 with detection of 2D relative movements between the device, or an operating part thereof, and a plane or surface, e.g. 2D mice, trackballs, pens or pucks
- 3/03541 {Mouse/trackball convertible devices, in which the same ball is used to track the 2D relative movement}
- 3/03542 {Light pens for emitting or receiving light}
- 3/03543 {Mice or pucks ([G06F 3/03541](#) takes precedence)}
- 3/03544 {having dual sensing arrangement, e.g. two balls or two coils used to track rotation of the pointing device}
- 3/03545 {Pens or stylus}
- 3/03546 {using a rotatable ball at the tip as position detecting member}
- 3/03547 {Touch pads, in which fingers can move on a surface}

- 3/03548 {Sliders, in which the moving part moves in a plane}
- 3/03549 {Trackballs ([G06F 3/03541](#) takes precedence)}
- 3/0362 with detection of 1D translations or rotations of an operating part of the device, e.g. scroll wheels, sliders, knobs, rollers or belts
- 3/037 using the raster scan of a cathode-ray tube [CRT] for detecting the position of the member, e.g. light pens cooperating with CRT monitors
- 3/038 Control and interface arrangements therefor, e.g. drivers or device-embedded control circuitry
- 3/0383 {Signal control means within the pointing device}
- 3/0386 {for light pen}
- 3/039 Accessories therefor, e.g. mouse pads ([furniture aspects A47B 21/00](#))
- 3/0395 {Mouse pads}
- 3/041 Digitisers, e.g. for touch screens or touch pads, characterised by the transducing means
- 3/0412 {Integrated displays and digitisers}
- 3/0414 {using force sensing means}
- 3/0416 {Control and interface arrangements for touch screen}
- 3/0418 {for error correction or compensation, e.g. parallax, calibration, alignment}
- 3/042 by opto-electronic means ([pens detecting optically their absolute position with respect to a coded surface G06F 3/0317](#))}
- 3/0421 {by interrupting or reflecting a light beam, e.g. optical touch-screen}
- 3/0423 {using sweeping light beams, e.g. using rotating or vibrating mirror}
- 3/0425 {using a single imaging device like a video camera for tracking the absolute position of a single or a plurality of objects with respect to an imaged reference surface, e.g. video camera imaging a display or a projection screen, a table or a wall surface, on which a computer generated image is displayed or projected ([tracking a projected light spot to determine a position on a display surface G06F 3/0386](#))}
- 3/0426 {tracking fingers with respect to a virtual keyboard projected or printed on the surface ([virtual keyboards on touch screens G06F 3/04886](#))}
- 3/0428 {by sensing at the edges of the touch surface the interruption of optical paths, e.g. an illumination plane, parallel to the touch surface which may be virtual ([sensing beam interruptions in a planar beam grid of an optical touch-screen G06F 3/0421](#))}
- 3/043 using propagating acoustic waves
- 3/0433 {in which the acoustic waves are either generated by a movable member and propagated within a surface layer or propagated within a surface layer and captured by a movable member}
- 3/0436 {in which generating transducers and detecting transducers are attached to a single acoustic waves transmission substrate}
- 3/044 by capacitive means
- 3/045 using resistive elements, e.g. single continuous surface or two parallel surfaces put in contact
- 3/046 by electromagnetic means
- 3/047 using sets of wires, e.g. crossed wires
- 3/048 Interaction techniques based on graphical user interfaces [GUI]
- NOTES**
1. This group [covers](#) subject matter where the focus is placed on the way the user can interact with the displayed data. The mere presence of a standard GUI in the context of the disclosure of a specific software application or a specific device capable of processing data related to its specific function, should be in general classified in the appropriate subclasses related to those software applications or specific devices.
 2. In this group, multi-aspect classification is applied, so that subject matter characterised by aspects covered by more than one of its groups, which is considered to represent information of interest for search, should be classified in each of those groups.
- 3/0481 based on specific properties of the displayed interaction object or a metaphor-based environment, e.g. interaction with desktop elements like windows or icons, or assisted by a cursor's changing behaviour or appearance
- 3/04812 {interaction techniques based on cursor appearance or behaviour being affected by the presence of displayed objects, e.g. visual feedback during interaction with elements of a graphical user interface through change in cursor appearance, constraint movement or attraction/repulsion with respect to a displayed object ([interaction techniques based on cursor behaviour involving tactile or force feedback G06F 3/016](#))}
- 3/04815 {Interaction with three-dimensional environments, e.g. control of viewpoint to navigate in the environment}
- 3/04817 {using icons ([graphical programming languages using iconic symbols G06F 8/34](#))}
- 3/0482 interaction with lists of selectable items, e.g. menus
- 3/0483 interaction with page-structured environments, e.g. book metaphor
- 3/0484 for the control of specific functions or operations, e.g. selecting or manipulating an object or an image, setting a parameter value or selecting a range
- 3/04842 {Selection of a displayed object ([G06F 3/0482](#) takes precedence)}
- 3/04845 {for image manipulation, e.g. dragging, rotation}
- 3/04847 {Interaction techniques to control parameter settings, e.g. interaction with sliders, dials}
- 3/0485 Scrolling or panning

- 3/04855 {Interaction with scrollbars}
- 3/0486 Drag-and-drop
- 3/0487 using specific features provided by the input device, e.g. functions controlled by the rotation of a mouse with dual sensing arrangements, or of the nature of the input device, e.g. tap gestures based on pressure sensed by a digitiser
- 3/0488 using a touch-screen or digitiser, e.g. input of commands through traced gestures
- 3/04883 {for entering handwritten data, e.g. gestures, text}
- 3/04886 {by partitioning the screen or tablet into independently controllable areas, e.g. virtual keyboards, menus ([G06F 3/04883 takes precedence](#))}
- 3/0489 using dedicated keyboard keys or combinations thereof
- 3/04892 {Arrangements for controlling cursor position based on codes indicative of cursor displacements from one discrete location to another, e.g. using cursor control keys associated to different directions or using the tab key ([arrangements for controlling cursor position based on coordinate signals G06F 3/038](#))}
- 3/04895 {Guidance during keyboard input operation, e.g. prompting ([help systems G06F 9/453](#))}
- 3/04897 {Special input arrangements or commands for improving display capability}
- 3/05 Digital input using the sampling of an analogue quantity at regular intervals of time {, input from a/d converter or output to d/a converter}
- 3/06 Digital input from or digital output to record carriers, {e.g. RAID, emulated record carriers, networked record carriers ([recording or reproducing devices per se G11B](#); error detection, error correction, monitoring [per se](#) regarding storage systems [G06F 11/00](#); accessing or addressing within memory systems or architectures [G06F 12/00](#); information retrieval [G06F 16/00](#))}
- 3/0601 {Dedicated interfaces to storage systems}
- 3/0602 {specifically adapted to achieve a particular effect}
- 3/0604 {Improving or facilitating administration, e.g. storage management}
- 3/0605 {by facilitating the interaction with a user or administrator}
- 3/0607 {by facilitating the process of upgrading existing storage systems, e.g. for improving compatibility between host and storage device}
- 3/0608 {Saving storage space on storage systems}
- 3/061 {Improving I/O performance}
- 3/0611 {in relation to response time}
- 3/0613 {in relation to throughput}
- 3/0614 {Improving the reliability of storage systems}
- 3/0616 {in relation to life time, e.g. increasing Mean Time Between Failures [MTBF]}
- 3/0617 {in relation to availability}
- 3/0619 {in relation to data integrity, e.g. data losses, bit errors}
- 3/062 {Securing storage systems}
- 3/0622 {in relation to access}
- 3/0623 {in relation to content}
- 3/0625 {Power saving in storage systems}
- 3/0626 {Reducing size or complexity of storage systems}
- 3/0628 {making use of a particular technique}
- 3/0629 {Configuration or reconfiguration of storage systems}
- 3/0631 {by allocating resources to storage systems}
- 3/0632 {by initialisation or re-initialisation of storage systems}
- 3/0634 {by changing the state or mode of one or more devices}
- 3/0635 {by changing the path, e.g. traffic rerouting, path reconfiguration}
- 3/0637 {Permissions}
- 3/0638 {Organizing or formatting or addressing of data}
- 3/064 {Management of blocks}
- 3/0641 {De-duplication techniques}
- 3/0643 {Management of files}
- 3/0644 {Management of space entities, e.g. partitions, extents, pools}
- 3/0646 {Horizontal data movement in storage systems, i.e. moving data in between storage devices or systems}
- 3/0647 {Migration mechanisms}
- 3/0649 {Lifecycle management}
- 3/065 {Replication mechanisms}
- 3/0652 {Erasing, e.g. deleting, data cleaning, moving of data to a wastebasket}
- 3/0653 {Monitoring storage devices or systems}
- 3/0655 {Vertical data movement, i.e. input-output transfer; data movement between one or more hosts and one or more storage devices}
- 3/0656 {Data buffering arrangements}
- 3/0658 {Controller construction arrangements}
- 3/0659 {Command handling arrangements, e.g. command buffers, queues, command scheduling}
- 3/0661 {Format or protocol conversion arrangements}
- 3/0662 {Virtualisation aspects}
- 3/0664 {at device level, e.g. emulation of a storage device or system}
- 3/0665 {at area level, e.g. provisioning of virtual or logical volumes}
- 3/0667 {at data level, e.g. file, record or object virtualisation}
- 3/0668 {adopting a particular infrastructure}
- 3/067 {Distributed or networked storage systems, e.g. storage area networks [SAN], network attached storage [NAS]}
- 3/0671 {In-line storage system}
- 3/0673 {Single storage device}
- 3/0674 {Disk device}
- 3/0676 {Magnetic disk device}
- 3/0677 {Optical disk device, e.g. CD-ROM, DVD}
- 3/0679 {Non-volatile semiconductor memory device, e.g. flash memory, one time programmable memory [OTP]}

3/068	. . . . .	{Hybrid storage device}	3/1218	. . . . .	{Reducing or saving of used resources, e.g. avoiding waste of consumables or improving usage of hardware resources}
3/0682	. . . . .	{Tape device}	3/1219	. . . . .	{with regard to consumables, e.g. ink, toner, paper}
3/0683	. . . . .	{Plurality of storage devices}	3/122	. . . . .	{with regard to computing resources, e.g. memory, CPU}
3/0685	. . . . .	{Hybrid storage combining heterogeneous device types, e.g. hierarchical storage, hybrid arrays}	3/1221	. . . . .	{with regard to power consumption}
3/0686	. . . . .	{Libraries, e.g. tape libraries, jukebox}	3/1222	. . . . .	{Increasing security of the print job}
3/0688	. . . . .	{Non-volatile semiconductor memory arrays}	3/1223	. . . . .	{specifically adapted to use a particular technique}
3/0689	. . . . .	{Disk arrays, e.g. RAID, JBOD}	3/1224	. . . . .	{Client or server resources management}
2003/0691	. . . . .	{buffering arrangements}	3/1225	. . . . .	{Software update, e.g. print driver, modules, plug-ins, fonts}
2003/0692	. . . . .	{digital I/O from or to direct access storage devices, e.g. magnetic, optical, magneto-optical disc}	3/1226	. . . . .	{Discovery of devices having required properties}
2003/0694	. . . . .	{emulating arrangements, e.g. RAM-disc}	3/1227	. . . . .	{Printer definition files}
2003/0695	. . . . .	{formatting arrangements}	3/1228	. . . . .	{Printing driverless or using generic drivers}
2003/0697	. . . . .	{device management, e.g. handlers, drivers, I/O schedulers}	3/1229	. . . . .	{Printer resources management or printer maintenance, e.g. device status, power levels}
2003/0698	. . . . .	{digital I/O from or to serial access storage devices, e.g. magnetic tape}	3/123	. . . . .	{Software or firmware update, e.g. device firmware management}
3/08	. . . . .	from or to individual record carriers, e.g. punched card {, memory card, integrated circuit [IC] card, smart card (record carriers for use with machines and with at least a part designed to carry digital markings G06K 19/00 ; coded identity card or credit card with a coded signal G07F 7/10)}	3/1231	. . . . .	{Device related settings, e.g. IP address, Name, Identification}
3/09	. . . . .	Digital output to typewriters	3/1232	. . . . .	{Transmitting printer device capabilities, e.g. upon request or periodically}
3/12	. . . . .	Digital output to print unit {, e.g. line printer, chain printer}	3/1234	. . . . .	{Errors handling and recovery, e.g. reprinting (G06F 3/1261 takes precedence)}
3/1201	. . . . .	{Dedicated interfaces to print systems}	3/1235	. . . . .	{caused by end of consumables, e.g. paper, ink, toner}
3/1202	. . . . .	{specifically adapted to achieve a particular effect}	3/1236	. . . . .	{Connection management}
3/1203	. . . . .	{Improving or facilitating administration, e.g. print management}	3/1237	. . . . .	{Print job management}
3/1204	. . . . .	{resulting in reduced user or operator actions, e.g. presetting, automatic actions, using hardware token storing data}	3/1238	. . . . .	{Secure printing, e.g. user identification, user rights for device usage, unallowed content, blanking portions or fields of a page, releasing held jobs}
3/1205	. . . . .	{resulting in increased flexibility in print job configuration, e.g. job settings, print requirements, job tickets}	3/1239	. . . . .	{Restricting the usage of resources, e.g. usage or user levels, credit limit, consumables, special fonts}
3/1206	. . . . .	{resulting in increased flexibility in input data format or job format or job type}	3/124	. . . . .	{Parallel printing or parallel ripping}
3/1207	. . . . .	{resulting in the user being informed about print result after a job submission}	3/1241	. . . . .	{Dividing a job according to job requirements, e.g. black/white and colour pages, covers and body of books, tabs}
3/1208	. . . . .	{resulting in improved quality of the output result, e.g. print layout, colours, workflows, print preview}	3/1242	. . . . .	{Image or content composition onto a page}
3/1209	. . . . .	{resulting in adapted or bridged legacy communication protocols, e.g. emulation, protocol extension}	3/1243	. . . . .	{Variable data printing, e.g. document forms, templates, labels, coupons, advertisements, logos, watermarks, transactional printing, fixed content versioning}
3/121	. . . . .	{Facilitating exception or error detection and recovery, e.g. fault, media or consumables depleted}	3/1244	. . . . .	{Job translation or job parsing, e.g. page banding}
3/1211	. . . . .	{Improving printing performance}	3/1245	. . . . .	{by conversion to intermediate or common format}
3/1212	. . . . .	{achieving reduced delay between job submission and print start}	3/1246	. . . . .	{by handling markup languages, e.g. XSL, XML, HTML}
3/1213	. . . . .	{at an intermediate node or at the final node}	3/1247	. . . . .	{by conversion to printer ready format}
3/1214	. . . . .	{at the submitting node}	3/1248	. . . . .	{by printer language recognition, e.g. PDL, PCL, PDF}
3/1215	. . . . .	{achieving increased printing speed, i.e. reducing the time between printing start and printing end}	3/125	. . . . .	{Page layout or assigning input pages onto output media, e.g. imposition}
3/1217	. . . . .	{achieving reduced idle time at the output device or increased asset utilization}			

- 3/1251 {for continuous media, e.g. web media, rolls}
- 3/1252 {for sheet based media}
- 3/1253 {Configuration of print job parameters, e.g. using UI at the client}
- 3/1254 {Automatic configuration, e.g. by driver}
- 3/1255 {Settings incompatibility, e.g. constraints, user requirements vs. device capabilities}
- 3/1256 {User feedback, e.g. print preview, test print, proofing, pre-flight checks}
- 3/1257 {by using pre-stored settings, e.g. job templates, presets, print styles}
- 3/1258 {by updating job settings at the printer}
- 3/1259 {Print job monitoring, e.g. job status}
- 3/126 {Job scheduling, e.g. queuing, determine appropriate device}
- 3/1261 {by using alternate printing}
- 3/1262 {by grouping or ganging jobs}
- 3/1263 {based on job priority, e.g. re-arranging the order of jobs, e.g. the printing sequence}
- 3/1264 {by assigning post-processing resources}
- 3/1265 {Printing by reference, e.g. retrieving document/image data for a job from a source mentioned in the job}
- 3/1267 {Job repository, e.g. non-scheduled jobs, delay printing}
- 3/1268 {Job submission, e.g. submitting print job order or request not the print data itself}
- 3/1269 {by broadcasting server}
- 3/127 {by using hot folders, e.g. folder for which print settings or print data management rules are set in advance}
- 3/1271 {Job submission at the printing node, e.g. creating a job from a data stored locally or remotely ([G06F 3/1238 takes precedence](#))}
- 3/1272 {Digital storefront, e.g. e-ordering, web2print, submitting a job from a remote submission screen}
- 3/1273 {Print job history, e.g. logging, accounting, tracking}
- 3/1274 {Deleting of print job}
- 3/1275 {Print workflow management, e.g. defining or changing a workflow, cross publishing}
- 3/1276 {within a printer driver, e.g. driver resides either on a server or on a client}
- 3/1277 {using filter pipeline, e.g. outside the driver, adding traps}
- 3/1278 . . . {specifically adapted to adopt a particular infrastructure}
- 3/1279 {Controller construction, e.g. aspects of the interface hardware}
- 3/128 {Direct printing, e.g. sending document file, using memory stick, printing from a camera}
- 3/1281 {Multi engine printer devices, e.g. one entity having multiple output engines}
- 3/1282 {High volume printer device}
- 3/1284 {Local printer device}
- 3/1285 {Remote printer device, e.g. being remote from client or server}
- 3/1286 {via local network}
- 3/1287 {via internet}
- 3/1288 {in client-server-printer device configuration}
- 3/1289 {in server-client-printer device configuration, e.g. the server does not see the printer}
- 3/129 {in server-printer device-client configuration, e.g. print flow goes from server to printer and then bidirectional from printer to client, i.e. the client does not communicate with the server}
- 3/1291 {Pool of printer devices: self-managing printing devices in a network, e.g. without a server}
- 3/1292 {Mobile client, e.g. wireless printing}
- 3/1293 . . . {Printer information exchange with computer}
- 3/1294 . . . {Status or feedback related to information exchange}
- 3/1295 . . . {Buffering means}
- 3/1296 . . . {Printer job scheduling or printer resource handling}
- 3/1297 . . . {Printer code translation, conversion, emulation, compression; Configuration of printer parameters}
- 3/1298 . . . {Printer language recognition, e.g. programme control language, page description language}
- 3/13 . . . Digital output to plotter {; Cooperation and interconnection of the plotter with other functional units}
- 3/14 . . . Digital output to display device; {Cooperation and interconnection of the display device with other functional units} ([control of display in general G09G](#); [arrangements for producing a permanent visual presentation of the output data G06K 15/00](#))
- 3/1407 . . . {General aspects irrespective of display type, e.g. determination of decimal point position, display with fixed or driving decimal point, suppression of non-significant zeros}
- 3/1415 . . . {with means for detecting differences between the image stored in the host and the images displayed on the displays}
- 3/1423 . . . {controlling a plurality of local displays, e.g. CRT and flat panel display}
- 3/1431 . . . {using a single graphics controller}
- 3/1438 . . . {using more than one graphics controller}
- 3/1446 . . . {display composed of modules, e.g. video walls}
- 3/1454 . . . {involving copying of the display data of a local workstation or window to a remote workstation or window so that an actual copy of the data is displayed simultaneously on two or more displays, e.g. teledisplay}
- 3/1462 . . . {with means for detecting differences between the image stored in the host and the images displayed on the remote displays}
- 3/147 . . . using display panels
- 3/1475 . . . {with conversion of CRT control signals to flat panel control signals, e.g. adapting the palette memory}
- 3/153 . . . using cathode-ray tubes
- 3/16 . . . Sound input; Sound output ([conversion of speech into digital information or vice versa G10L](#))

- 3/162 . . {Interface to dedicated audio devices, e.g. audio drivers, interface to CODECs}
- 3/165 . . {Management of the audio stream, e.g. setting of volume, audio stream path}
- 3/167 . . {Audio in a user interface, e.g. using voice commands for navigating, audio feedback}
- 5/00 Methods or arrangements for data conversion without changing the order or content of the data handled (by coding or decoding H03M)**
- 5/01 . for shifting, e.g. justifying, scaling, normalising {(digital stores in which the information is moved stepwise, e.g. shift-registers G11C 19/00; digital stores in which the information circulates G11C 21/00)}
- 5/012 . . {in floating-point computations}
- 5/015 . . {having at least two separately controlled shifting levels, e.g. using shifting matrices (G06F 5/012 takes precedence)}
- 5/017 . . {using recirculating storage elements}
- 5/06 . for changing the speed of data flow, i.e. speed regularising {or timing, e.g. delay lines, FIFO buffers; over- or underrun control therefor; (G06F 7/78 takes precedence)}
- 5/065 . . {Partitioned buffers, e.g. allowing multiple independent queues, bidirectional FIFO's}
- 5/08 . . having a sequence of storage locations, the intermediate ones not being accessible for either enqueue or dequeue operations, e.g. using a shift register {(G06F 5/065 takes precedence; shift registers per se G11C 19/00)}
- 5/085 . . . {in which the data is recirculated}
- 5/10 . . having a sequence of storage locations each being individually accessible for both enqueue and dequeue operations, e.g. using random access memory {(G06F 5/065 takes precedence)}
- 5/12 . . . Means for monitoring the fill level; Means for resolving contention, i.e. conflicts between simultaneous enqueue and dequeue operations
- 5/14 . . . for overflow or underflow handling, e.g. full or empty flags
- 5/16 . . Multiplexed systems, i.e. using two or more similar devices that are alternately accessed for enqueue and dequeue operations, e.g. ping pong buffers
- 7/00 Methods or arrangements for processing data by operating upon the order or content of the data handled (logic circuits H03K 19/00)**
- 7/02 . Comparing digital values (G06F 7/06, {G06F 7/22, } G06F 7/38 take precedence; information retrieval G06F 16/00; comparing pulses H03K 5/22)
- 7/023 . . {adaptive, e.g. self learning}
- 7/026 . . {Magnitude comparison, i.e. determining the relative order of operands based on their numerical value, e.g. window comparator}
- 7/06 . Arrangements for sorting, selecting, merging or comparing data on individual record carriers (sorting of postal letters B07C; conveying record carriers from one station to another G06K 13/02)
- 7/08 . . Sorting, i.e. grouping record carriers in numerical or other ordered sequence according to the classification of at least some of the information they carry (by merging two or more sets of carriers in ordered sequence G06F 7/16)
- 7/10 . . Selecting, i.e. obtaining data of one kind from those record carriers which are identifiable by data of a second kind from a mass of ordered or randomly-distributed record carriers
- 7/12 . . . with provision for printing-out a list of selected items
- 7/14 . . Merging, i.e. combining at least two sets of record carriers each arranged in the same ordered sequence to produce a single set having the same ordered sequence
- 7/16 . . . Combined merging and sorting
- 7/20 . . Comparing separate sets of record carriers arranged in the same sequence to determine whether at least some of the data in one set is identical with that in the other set or sets
- 7/22 . Arrangements for sorting or merging computer data on continuous record carriers, e.g. tape, drum, disc
- 7/24 . . Sorting, i.e. extracting data from one or more carriers, rearranging the data in numerical or other ordered sequence, and rerecording the sorted data on the original carrier or on a different carrier or set of carriers {sorting methods in general} (G06F 7/36 takes precedence)
- 7/26 . . . the sorted data being recorded on the original record carrier within the same space in which the data had been recorded prior to their sorting, without using intermediate storage {(contains no documents, see G06F 7/24)}
- 7/32 . . Merging, i.e. combining data contained in ordered sequence on at least two record carriers to produce a single carrier or set of carriers having all the original data in the ordered sequence {merging methods in general} (G06F 7/36 takes precedence)
- 7/36 . . Combined merging and sorting
- 7/38 . Methods or arrangements for performing computations using exclusively denominational number representation, e.g. using binary, ternary, decimal representation
- 7/381 . . {using cryogenic components, e.g. Josephson gates}
- 7/383 . . {using magnetic or similar elements (parametric and other resonant circuits G06F 7/388)}
- 7/385 . . . {magnetic bubbles}
- 7/386 . . . {decimal, radix 20 or 12 (G06F 7/385 takes precedence)}
- 7/388 . . {using other various devices such as electro-chemical, microwave, surface acoustic wave, neuristor, electron beam switching, resonant, e.g. parametric, ferro-resonant}
- 7/40 . . using contact-making devices, e.g. electro-magnetic relay (G06F 7/46 takes precedence)
- 7/405 . . . {binary}
- 7/42 . . . Adding; Subtracting {(G06F 7/405 takes precedence)}
- 7/44 . . . Multiplying; Dividing {(G06F 7/405 takes precedence)}
- 7/443 {by successive additions or subtractions}
- 7/446 {by partial product forming (with electric multiplication table)}
- 7/46 . . using electromechanical counter-type accumulators
- 7/461 . . . {Adding; subtracting}
- 7/462 . . . {Multiplying; dividing}
- 7/463 {by successive additions or subtractions}

7/465	. . . . {by partial product forming (with electric multiplication table)}	7/499	. . . Denomination or exception handling, e.g. rounding, overflow
7/466	. . . . {by successive multiplication or division by 2}		NOTE
7/467	. . . . {by using preset multiples of the multiplicand or the divisor}		{ documents published before 12-2005 are not systematically classified in the subgroups of G06F 7/499 : See the relevant subgroup of G06F 7/48 and the ICOs G06F 7/499 + }
7/468	. . . {for evaluating functions by calculation}	7/49905	. . . . {Exception handling}
7/48	. . using non-contact-making devices, e.g. tube, solid state device; using unspecified devices	7/4991	. . . . {Overflow or underflow}
7/4806	. . . {Computations with complex numbers}	7/49915	. . . . {Mantissa overflow or underflow in handling floating-point numbers}
7/4812	. . . . {Complex multiplication}	7/49921	. . . . {Saturation, i.e. clipping the result to a minimum or maximum value}
7/4818	. . . . {using coordinate rotation digital computer [CORDIC]}	7/49926	. . . . {Division by zero}
7/4824	. . . {using signed-digit representation}	7/49931	. . . . {Modulo N reduction of final result}
7/483	. . . Computations with numbers represented by a non-linear combination of denominational numbers, e.g. rational numbers, logarithmic number system, floating-point numbers (conversion to or from floating-point codes H03M 7/24) { (G06F 7/4806 , G06F 7/4824 , G06F 7/49 , G06F 7/491 , G06F 7/544 take precedence)}	7/49936	. . . . {Normalisation mentioned as feature only}
7/4833	. . . . {Logarithmic number system}	7/49942	. . . . {Significance control}
7/4836	. . . . {Computations with rational numbers}	7/49947	. . . . {Rounding}
7/485	. . . . Adding; Subtracting { (G06F 7/4833 , G06F 7/4836 take precedence)}	7/49952	. . . . {Sticky bit}
7/487	. . . . Multiplying; Dividing { (G06F 7/4833 , G06F 7/4836 take precedence)}	7/49957	. . . . {Implementation of IEEE-754 Standard}
7/4873	. . . . {Dividing}	7/49963	. . . . {Rounding to nearest (G06F 7/49957 takes precedence)}
7/4876	. . . . {Multiplying}	7/49968	. . . . {Rounding towards positive infinity (G06F 7/49957 takes precedence)}
7/49	. . . Computations with a radix, other than binary, 8, 16 or decimal, e.g. ternary, negative or imaginary radices, mixed radix {non-linear PCM (G06F 7/4824 takes precedence)}	7/49973	. . . . {Rounding towards negative infinity, e.g. truncation of two's complement numbers (G06F 7/49957 takes precedence)}
7/491	. . . Computations with decimal numbers {radix 12 or 20. (G06F 7/4824 takes precedence)}	7/49978	. . . . {Rounding towards zero (G06F 7/49957 takes precedence)}
7/4912	. . . . {Adding; Subtracting (G06F 7/492 , G06F 7/498 take precedence)}	7/49984	. . . . {Rounding away from zero}
7/4915	. . . . {Multiplying; Dividing (G06F 7/492 , G06F 7/498 take precedence)}	7/49989	. . . . {Interval arithmetic}
7/4917	. . . . {Dividing}	7/49994	. . . . {Sign extension}
7/492	. . . . using a binary weighted representation within each denomination { (G06F 7/498 takes precedence)}	7/50	. . . Adding; Subtracting (G06F 7/483 - G06F 7/491 , G06F 7/544 take precedence)
7/4925	. . . . {Adding; Subtracting (G06F 7/493 takes precedence)}	7/501	. . . . Half or full adders, i.e. basic adder cells for one denomination (EXCLUSIVE-OR circuits H03K 19/21)
7/493	. . . . the representation being the natural binary coded representation, i.e. 8421-code	7/5013	. . . . {using algebraic addition of the input signals, e.g. Kirchhoff adders}
7/494	. . . . Adding; Subtracting	7/5016	. . . . {forming at least one of the output signals directly from the minterms of the input signals, i.e. with a minimum number of gate levels}
7/495	. . . . in digit-serial fashion, i.e. having a single digit-handling circuit treating all denominations after each other	7/502	. . . . Half adders; Full adders consisting of two cascaded half adders { (G06F 7/5013 takes precedence)}
7/496	. . . . Multiplying; Dividing	7/503	. . . . using carry switching, i.e. the incoming carry being connected directly, or only via an inverter, to the carry output under control of a carry propagate signal
7/498	. . . . using counter-type accumulators	7/504	. . . . in bit-serial fashion, i.e. having a single digit-handling circuit treating all denominations after each other
7/4981	. . . . {Adding; Subtracting}	7/5045	. . . . {for multiple operands}
7/4983	. . . . {Multiplying; Dividing}	7/505	. . . . in bit-parallel fashion, i.e. having a different digit-handling circuit for each denomination { (half or full adders G06F 7/501) }
7/4985	. . . . {by successive additions or subtractions}	7/5052	. . . . {using carry completion detection, either over all stages or at sample stages only}
7/4986	. . . . {by successive multiplication or division by 2}		
7/4988	. . . . {by table look-up}		

- 7/5055 {in which one operand is a constant, i.e. incrementers or decrementers}
- 7/5057 {using table look-up}; using programmable logic arrays ([G06F 7/509 takes precedence](#))
- 7/506 with simultaneous carry generation for, or propagation over, two or more stages
- 7/507 using selection between two conditionally calculated carry or sum values
- 7/508 using carry look-ahead circuits
- 7/509 for multiple operands, e.g. digital integrators
- 7/5095 {word-serial, i.e. with an accumulator-register}
- 7/52 . . . Multiplying; Dividing ([G06F 7/483 - G06F 7/491, G06F 7/544 take precedence](#))
- 7/523 Multiplying only
- 7/5235 {using indirect methods, e.g. quarter square method, via logarithmic domain}
- 7/525 in serial-serial fashion, i.e. both operands being entered serially ([G06F 7/533 takes precedence](#))
- 7/527 in serial-parallel fashion, i.e. one operand being entered serially and the other in parallel ([G06F 7/533 takes precedence](#))
- 7/5272 {with row wise addition of partial products}
- 7/5275 {using carry save adders}
- 7/5277 {with column wise addition of partial products}
- 7/53 in parallel-parallel fashion, i.e. both operands being entered in parallel ([G06F 7/533 takes precedence](#))
- 7/5306 {with row wise addition of partial products ([G06F 7/5324 takes precedence](#))}
- 7/5312 {using carry save adders}
- 7/5318 {with column wise addition of partial products, e.g. using Wallace tree, Dadda counters ([G06F 7/5324 takes precedence](#))}
- 7/5324 {partitioned, i.e. using repetitively a smaller parallel parallel multiplier or using an array of such smaller multipliers}
- 7/533 Reduction of the number of iteration steps or stages, e.g. using the Booth algorithm, log-sum, odd-even
- 7/5332 {by skipping over strings of zeroes or ones, e.g. using the Booth Algorithm}
- 7/5334 {by using multiple bit scanning, i.e. by decoding groups of successive multiplier bits in order to select an appropriate precalculated multiple of the multiplicand as a partial product}
- 7/5336 {overlapped, i.e. with successive bitgroups sharing one or more bits being recoded into signed digit representation, e.g. using the Modified Booth Algorithm}
- 7/5338 {each bitgroup having two new bits, e.g. 2nd order MBA}
- 7/535 Dividing only
- 7/537 Reduction of the number of iteration steps or stages, e.g. using the Sweeny-Robertson-Tocher [SRT] algorithm {(not used, see [G06F 7/535](#) or [G06F 7/5375](#))}
- 7/5375 {Non restoring calculation, where each digit is either negative, zero or positive, e.g. SRT;}
- WARNING**
Not complete. Provisionally see [G06F 7/535](#) + [G06F 7/5375](#)
- 7/544 . . . for evaluating functions by calculation {([G06F 7/4824 takes precedence](#))}
- 7/5443 {Sum of products (for applications thereof, see the relevant places, e.g. [G06F 17/10, H03H 17/00](#))}
- 7/5446 {using crossaddition algorithms, e.g. CORDIC}
- 7/548 Trigonometric functions; Co-ordinate transformations
- 7/552 Powers or roots {, e.g. Pythagorean sums}
- 7/5525 {Roots or inverse roots of single operands}
- 7/556 Logarithmic or exponential functions
- 7/57 . . . Arithmetic logic units [ALU], i.e. arrangements or devices for performing two or more of the operations covered by groups [G06F 7/483 - G06F 7/556](#) or for performing logical operations (instruction execution [G06F 9/30](#) {[G06F 7/49, G06F 7/491 take precedence](#); logic gate circuits [H03K 19/00](#)})
- 7/575 Basic arithmetic logic units, i.e. devices selectable to perform either addition, subtraction or one of several logical operations, using, at least partially, the same circuitry
- 7/58 . . . Random or pseudo-random number generators
- 7/582 . . . {Pseudo-random number generators}
- 7/584 . . . {using finite field arithmetic, e.g. using a linear feedback shift register}
- 7/586 . . . {using an integer algorithm, e.g. using linear congruential method}
- 7/588 . . . {Random number generators, i.e. based on natural stochastic processes}
- 7/60 . . . Methods or arrangements for performing computations using a digital non-denominational number representation, i.e. number representation without radix; Computing devices using combinations of denominational and non-denominational quantity representations {, e.g. using difunction pulse trains, STEELE computers, phase computers (conversion of digital data to or from non-denominational form [H03M 5/00, H03M 7/00](#))}
- 7/602 . . . {using delta-sigma sequences}
- 7/605 . . . {Additive or subtractive mixing of two pulse rates into one (beat-frequency oscillators [H03B 21/00](#); input circuits of electric counters, e.g. up-down counters [H03K 21/00](#))}

- 7/607 . . {number-of-ones counters, i.e. devices for counting the number of input lines set to ONE among a plurality of input lines, also called bit counters or parallel counters (for applications thereof, see the relevant places, e.g. [G06F 7/49](#), [G06F 7/5013](#), [G06F 7/509](#), [H03M 1/00](#), [H03M 7/20](#))}
- 7/62 . . Performing operations exclusively by counting total number of pulses {; Multiplication, division or derived operations using combined denominational and incremental processing by counters, i.e. without column shift ([G06F 7/68](#) takes precedence)}
- 7/64 . . Digital differential analysers, i.e. computing devices for differentiation, integration or solving differential or integral equations, using pulses representing increments; Other incremental computing devices for solving difference equations ([G06F 7/70](#) takes precedence; differential analysers using hybrid computing techniques [G06J 1/02](#) {; DDA application in numerical control [G05B 19/18](#))}
- 7/66 . . . wherein pulses represent unitary increments only
- 7/68 . . using pulse rate multipliers or dividers {pulse rate multipliers or dividers *per se*} ([G06F 7/70](#) takes precedence {; frequency division in electronic watches [G04G 3/02](#); frequency multiplication or division in oscillators [H03B 19/00](#); frequency dividing counters *per se* [H03K 23/00](#) - [H03K 29/00](#))}
- 7/70 . . using stochastic pulse trains, i.e. randomly occurring pulses the average pulse rates of which represent numbers {(conversion of analogue signals into stochastic pulse trains and *vice versa* [H03M 1/04](#))}
- 7/72 . . using residue arithmetic
- 7/721 . . . {Modular inversion, reciprocal or quotient calculation ([G06F 7/724](#), [G06F 7/727](#), [G06F 7/728](#) take precedence)}
- 7/722 . . . {Modular multiplication ([G06F 7/724](#), [G06F 7/727](#), [G06F 7/728](#) take precedence)}
- 7/723 . . . {Modular exponentiation ([G06F 7/724](#), [G06F 7/727](#), [G06F 7/728](#) take precedence)}
- 7/724 . . . {Finite field arithmetic (for error detection or correction in general [H03M 13/00](#), in computers [G06F 11/10](#))}
- 7/725 {over elliptic curves}
- 7/726 {Inversion; Reciprocal calculation; Division of elements of a finite field}
- 7/727 . . . {Modulo N arithmetic, with N being either $(2^{*}n)-1$, $2^{*}n$ or $(2^{*}n)+1$, e.g. mod 3, mod 4 or mod 5 ([G06F 7/728](#) takes precedence)}
- 7/728 . . . {using Montgomery reduction}
- 7/729 . . . {using representation by a residue number system}
- 7/74 . . Selecting or encoding within a word the position of one or more bits having a specified value, e.g. most or least significant one or zero detection, priority encoders {(with shifting [G06F 5/01](#))}
- 7/76 . . Arrangements for rearranging, permuting or selecting data according to predetermined rules, independently of the content of the data (according to the content of the data [G06F 7/06](#), [G06F 7/22](#); parallel / series conversion or *vice versa* [H03M 9/00](#))
- 7/762 . . {having at least two separately controlled rearrangement levels, e.g. multistage interconnection networks ([G06F 7/764](#) - [G06F 7/768](#) take precedence)}
- 7/764 . . {Masking}
- 7/766 . . {Generation of all possible permutations}
- 7/768 . . {Data position reversal, e.g. bit reversal, byte swapping}
- 7/78 . . for changing the order of data flow, e.g. matrix transposition, LIFO buffers; Overflow or underflow handling therefor
- 7/785 . . . {having a sequence of storage locations each being individually accessible for both enqueue and dequeue operations, e.g. using a RAM}
- 8/00 Arrangements for software engineering (testing or debugging [G06F 11/36](#); administrative, planning or organisation aspects of software project management [G06Q 10/06](#))**
- 8/10 . . Requirements analysis; Specification techniques
- 8/20 . . Software design
- 8/22 . . {Procedural}
- 8/24 . . {Object-oriented}
- 8/30 . . Creation or generation of source code
- 8/31 . . {Programming languages or programming paradigms}
- 8/311 . . . {Functional or applicative languages; Rewrite languages}
- 8/312 . . . {List processing, e.g. LISP programming language}
- 8/313 . . . {Logic programming, e.g. PROLOG programming language}
- 8/3135 {Unification or backtracking}
- 8/314 . . . {Parallel programming languages ([G06F 8/313](#) takes precedence)}
- 8/315 . . . {Object-oriented languages}
- 8/316 . . . {Aspect-oriented programming techniques}
- 8/33 . . Intelligent editors
- 8/34 . . Graphical or visual programming
- 8/35 . . Model driven
- 8/355 . . . {Round-trip engineering}
- 8/36 . . Software reuse
- 8/37 . . {Compiler construction; Parser generation}
- 8/38 . . for implementing user interfaces
- 8/40 . . Transformation of program code
- 8/41 . . Compilation
- 8/42 . . . {Syntactic analysis}
- 8/423 {Preprocessors}
- 8/425 {Lexical analysis}
- 8/427 {Parsing}
- 8/43 . . . {Checking; Contextual analysis}
- 8/433 {Dependency analysis; Data or control flow analysis}
- 8/434 {Pointers; Aliasing}
- 8/436 {Semantic checking}
- 8/437 {Type checking}
- 8/44 . . . {Encoding}

8/441	. . . . {Register allocation; Assignment of physical memory space to logical memory space}	8/654	. . . using techniques specially adapted for alterable solid state memories, e.g. for EEPROM or flash memories
8/443	. . . . {Optimisation}	8/656	. . . while running
8/4432	. . . . {Reducing the energy consumption}	8/658	. . . Incremental updates; Differential updates
8/4434	. . . . {Reducing the memory space required by the program code}	8/66	. . . {of program code stored in read-only memory [ROM]}
8/4435	. . . . . {Detection or removal of dead or redundant code}	8/70	. Software maintenance or management
8/4436	. . . . . {Exlining; Procedural abstraction}	8/71	. . Version control (security arrangements therefor G06F 21/57); Configuration management
8/4441	. . . . . {Reducing the execution time required by the program code}	WARNING	
8/4442	. . . . . {Reducing the number of cache misses; Data prefetching (cache prefetching G06F 12/0862)}	Group G06F 8/71 is impacted by reclassification into groups G06F 21/57 - G06F 21/577 .	
8/4443	. . . . . {Inlining}	All groups listed in this Warning should be considered in order to perform a complete search.	
8/445	. . . . {Exploiting fine grain parallelism, i.e. parallelism at instruction level (run-time instruction scheduling G06F 9/3836)}	8/72	. . Code refactoring
8/4451	. . . . . {Avoiding pipeline stalls}	8/73	. . Program documentation
8/4452	. . . . . {Software pipelining}	8/74	. . Reverse engineering; Extracting design information from source code
8/447	. . . . {Target code generation}	8/75	. . Structural analysis for program understanding
8/45	. . . {Exploiting coarse grain parallelism in compilation, i.e. parallelism between groups of instructions}	8/751	. . . {Code clone detection}
8/451	. . . . {Code distribution (considering CPU load at run-time G06F 9/505 ; load rebalancing G06F 9/5083)}	8/76	. . Adapting program code to run in a different environment; Porting
8/452	. . . . . {Loops}	8/77	. . Software metrics
8/453	. . . . {Data distribution}	8/78	. . {Methods to solve the "Year 2000" [Y2K] problem}
8/454	. . . . . {Consistency (cache consistency protocols in hierarchically structured memory systems G06F 12/0815)}	9/00	Arrangements for program control, e.g. control units (program control for peripheral devices G06F 13/10)
8/456	. . . . . {Parallelism detection}	9/02	. using wired connections, e.g. plugboards
8/457	. . . . . {Communication (intertask communication G06F 9/54)}	9/04	. using record carriers containing only program instructions (G06F 9/06 takes precedence)
8/458	. . . . . {Synchronisation, e.g. post-wait, barriers, locks (synchronisation among tasks G06F 9/52)}	9/06	. using stored programs, i.e. using an internal store of processing equipment to receive or retain programs
8/47	. . . {Retargetable compilers}	9/22	. . Microcontrol or microprogram arrangements
8/48	. . . {Incremental compilation (software reuse G06F 8/36)}	9/223	. . . {Execution means for microinstructions irrespective of the microinstruction function, e.g. decoding of microinstructions and nanoinstructions; timing of microinstructions; programmable logic arrays; delays and fan-out problems}
8/49	. . . {Partial evaluation}	9/226	. . . {Microinstruction function, e.g. input/output microinstruction; diagnostic microinstruction; microinstruction format}
8/51	. . Source to source	9/24	. . . Loading of the microprogram
8/52	. . Binary to binary	9/26	. . . Address formation of the next micro-instruction (G06F 9/28 takes precedence) (; Microprogram storage or retrieval arrangements)
8/53	. . Decompile; Disassembly	9/261	. . . . {Microinstruction address formation}
8/54	. . Link editing before load time	9/262	. . . . {Arrangements for next microinstruction selection}
8/60	. Software deployment	9/264	. . . . . {Microinstruction selection based on results of processing}
8/61	. . Installation	9/265	. . . . . {by address selection on input of storage}
8/62	. . . {Uninstallation}	9/267	. . . . . {by instruction selection on output of storage}
8/63	. . . {Image based installation; Cloning; Build to order}	9/268	. . . . . {Microinstruction selection not based on processing results, e.g. interrupt, patch, first cycle store, diagnostic programs}
8/64	. . . {Retargetable}		
8/65	. . Updates (security arrangements therefor G06F 21/57)		
WARNING			
Group G06F 8/65 is impacted by reclassification into groups G06F 21/57 - G06F 21/577 .			
All groups listed in this Warning should be considered in order to perform a complete search.			

9/28	. . .	Enhancement of operational speed, e.g. by using several microcontrol devices operating in parallel	9/3013	. . . . .	{according to data content, e.g. floating-point registers, address registers}
9/30	. .	Arrangements for executing machine instructions, e.g. instruction decode (for executing microinstructions G06F 9/22)	9/30134	. . . . .	{Register stacks; shift registers}
9/30003	. . .	{Arrangements for executing specific machine instructions}	9/30138	. . . . .	{Extension of register space, e.g. register cache}
9/30007	. . . . .	{to perform operations on data operands}	9/30141	. . . . .	{Implementation provisions of register files, e.g. ports}
9/3001	. . . . .	{Arithmetic instructions}	9/30145	. . .	{Instruction analysis, e.g. decoding, instruction word fields}
9/30014	. . . . .	{with variable precision}	9/30149	. . . . .	{of variable length instructions}
9/30018	. . . . .	{Bit or string instructions; instructions using a mask}	9/30152	. . . . .	{Determining start or end of instruction; determining instruction length}
9/30021	. . . . .	{Compare instructions, e.g. Greater-Than, Equal-To, MINMAX}	9/30156	. . . . .	{Special purpose encoding of instructions, e.g. Gray coding}
9/30025	. . . . .	{Format conversion instructions, e.g. Floating-Point to Integer, decimal conversion}	9/3016	. . . . .	{Decoding the operand specifier, e.g. specifier format}
9/30029	. . . . .	{Logical and Boolean instructions, e.g. XOR, NOT}	9/30163	. . . . .	{with implied specifier, e.g. top of stack}
9/30032	. . . . .	{Movement instructions, e.g. MOVE, SHIFT, ROTATE, SHUFFLE}	9/30167	. . . . .	{of immediate specifier, e.g. constants}
9/30036	. . . . .	{Instructions to perform operations on packed data, e.g. vector operations}	9/3017	. . .	{Runtime instruction translation, e.g. macros}
9/3004	. . . . .	{to perform operations on memory}	9/30174	. . . . .	{for non-native instruction set, e.g. Javabyte, legacy code}
9/30043	. . . . .	{LOAD or STORE instructions; Clear instruction}	9/30178	. . . . .	{of compressed or encrypted instructions}
9/30047	. . . . .	{Prefetch instructions; cache control instructions}	9/30181	. . .	{Instruction operation extension or modification}
9/3005	. . . . .	{to perform operations for flow control}	9/30185	. . . . .	{according to one or more bits in the instruction, e.g. prefix, sub-opcode}
9/30054	. . . . .	{Unconditional branch instructions}	9/30189	. . . . .	{according to execution mode, e.g. mode flag}
9/30058	. . . . .	{Conditional branch instructions}	9/30192	. . . . .	{according to data descriptor, e.g. dynamic data typing}
9/30061	. . . . .	{Multi-way branch instructions, e.g. CASE}	9/30196	. . . . .	{using decoder, e.g. decoder per instruction set, adaptable or programmable decoders}
9/30065	. . . . .	{Loop control instructions; iterative instructions, e.g. LOOP, REPEAT}	9/32	. . .	Address formation of the next instruction, e.g. by incrementing the instruction counter (G06F 9/38 takes precedence)
9/30069	. . . . .	{Instruction skipping instructions, e.g. SKIP}	9/321	. . . . .	{Program or instruction counter, e.g. incrementing}
9/30072	. . . . .	{to perform conditional operations, e.g. using guard}	9/322	. . . . .	{for non-sequential address}
9/30076	. . . . .	{to perform miscellaneous control operations, e.g. NOP}	9/324	. . . . .	{using program counter relative addressing}
9/30079	. . . . .	{Pipeline control instructions}	9/325	. . . . .	{for loops, e.g. loop detection, loop counter}
9/30083	. . . . .	{Power or thermal control instructions}	9/327	. . . . .	{for interrupts}
9/30087	. . . . .	{Synchronisation or serialisation instructions}	9/328	. . . . .	{for runtime instruction patching}
9/3009	. . . . .	{Thread control instructions}	9/34	. . .	Addressing or accessing the instruction operand or the result {; Formation of operand address; Addressing modes (address translation G06F 12/00)}
9/30094	. . .	{Condition code generation, e.g. Carry, Zero flag}	9/342	. . . . .	{Extension of operand address space}
9/30098	. . .	{Register arrangements}	9/345	. . . . .	of multiple operands or results (addressing multiple banks G06F 12/06)}
9/30101	. . . . .	{Special purpose registers}	9/3455	. . . . .	{using stride}
9/30105	. . . . .	{Register structure}	9/35	. . . . .	Indirect addressing {, i.e. using single address operand, e.g. address register}
9/30109	. . . . .	{having multiple operands in a single register}	9/355	. . . . .	Indexed addressing {, i.e. using more than one address operand}
9/30112	. . . . .	{for variable length data, e.g. single or double registers}	9/3552	. . . . .	{using wraparound, e.g. modulo or circular addressing}
9/30116	. . . . .	{Shadow registers, e.g. coupled registers, not forming part of the register space}	9/3555	. . . . .	{using scaling, e.g. multiplication of index}
9/3012	. . . . .	{Organisation of register space, e.g. banked or distributed register file}	9/3557	. . . . .	{using program counter as base address}
9/30123	. . . . .	{according to context, e.g. thread buffers}	9/38	. . .	Concurrent instruction execution, e.g. pipeline, look ahead
9/30127	. . . . .	{Register windows}	9/3802	. . . . .	{Instruction prefetching}

9/3804	. . . . .	{for branches, e.g. hedging, branch folding}	9/3871	. . . . .	{Asynchronous instruction pipeline, e.g. using handshake signals between stages}
9/3806	. . . . .	{using address prediction, e.g. return stack, branch history buffer}	9/3873	. . . . .	{Variable length pipelines, e.g. elastic pipeline}
9/3808	. . . . .	{for instruction reuse, e.g. trace cache, branch target cache}	9/3875	. . . . .	{Pipelining a single stage, e.g. superpipelining}
9/381	. . . . .	{Loop buffering}	9/3877	. . . . .	{using a slave processor, e.g. coprocessor (peripheral processor G06F 13/12 ; vector processor G06F 15/8053)}
9/3812	. . . . .	{with instruction modification, e.g. store into instruction stream}	9/3879	. . . . .	{for non-native instruction execution, e.g. executing a command; for Java instruction set}
9/3814	. . . . .	{Implementation provisions of instruction buffers, e.g. prefetch buffer; banks}	9/3881	. . . . .	{Arrangements for communication of instructions and data}
9/3816	. . . . .	{Instruction alignment, e.g. cache line crossing}	2009/3883	. . . . .	{Two-engine architectures, i.e. stand-alone processor acting as a slave processor}
9/3818	. . . . .	{Decoding for concurrent execution}	9/3885	. . . . .	{using a plurality of independent parallel functional units}
9/382	. . . . .	{Pipelined decoding, e.g. using predecoding}	9/3887	. . . . .	{controlled by a single instruction, e.g. SIMD}
9/3822	. . . . .	{Parallel decoding, e.g. parallel decode units}	9/3889	. . . . .	{controlled by multiple instructions, e.g. MIMD, decoupled access or execute}
9/3824	. . . . .	{Operand accessing}	9/3891	. . . . .	{organised in groups of units sharing resources, e.g. clusters}
9/3826	. . . . .	{Data result bypassing, e.g. locally between pipeline stages, within a pipeline stage}	9/3893	. . . . .	{controlled in tandem, e.g. multiplier-accumulator}
9/3828	. . . . .	{with global bypass, e.g. between pipelines, between clusters}	9/3895	. . . . .	{for complex operations, e.g. multidimensional or interleaved address generators, macros}
9/383	. . . . .	{Operand prefetching (cache prefetching G06F 12/0862)}	9/3897	. . . . .	{with adaptable data path}
9/3832	. . . . .	{Value prediction for operands; operand history buffers}	9/44	. .	Arrangements for executing specific programs
9/3834	. . . . .	{Maintaining memory consistency (cache consistency protocols G06F 12/0815)}	9/4401	. . .	Bootstrapping (security arrangements therefor G06F 21/57)
9/3836	. . . . .	{Instruction issuing, e.g. dynamic instruction scheduling, out of order instruction execution}	9/4403	. . . . .	{Processor initialisation}
9/3838	. . . . .	{Dependency mechanisms, e.g. register scoreboarding}	9/4405	. . . . .	{Initialisation of multiprocessor systems}
9/384	. . . . .	{Register renaming}	9/4406	. . . . .	{Loading of operating system}
9/3842	. . . . .	{Speculative instruction execution}	9/4408	. . . . .	{Boot device selection}
9/3844	. . . . .	{using dynamic prediction, e.g. branch history table}	9/441	. . . . .	{Multiboot arrangements, i.e. selecting an operating system to be loaded}
9/3846	. . . . .	{using static prediction, e.g. branch taken strategy}	9/4411	. . . . .	{Configuring for operating with peripheral devices; Loading of device drivers}
9/3848	. . . . .	{using hybrid branch prediction, e.g. selection between prediction techniques}	9/4413	. . . . .	{Plug-and-play [PnP]}
9/3851	. . . . .	{from multiple instruction streams, e.g. multistreaming (initiation or dispatching of multiple tasks or threads G06F 9/48)}	9/4415	. . . . .	{Self describing peripheral devices}
9/3853	. . . . .	{of compound instructions}	9/4416	. . . . .	{Network booting; Remote initial program loading [RIPL]}
9/3855	. . . . .	{Reordering, e.g. using a queue, age tags}	9/4418	. . . . .	{Suspend and resume; Hibernate and awake}
9/3857	. . . . .	{Result writeback, i.e. updating the architectural state}	9/442	. . . . .	{Shutdown}
9/3859	. . . . .	{with result invalidation, e.g. nullification}	9/445	. . .	Program loading or initiating (bootstrapping G06F 9/4401 ; security arrangements for program loading or initiating G06F 21/57)
9/3861	. . . . .	{Recovery, e.g. branch miss-prediction, exception handling (error detection or correction G06F 11/00)}	WARNING		
9/3863	. . . . .	{using multiple copies of the architectural state, e.g. shadow registers}	Group G06F 9/445 is impacted by reclassification into groups G06F 21/57 - G06F 21/577 .		
9/3865	. . . . .	{using deferred exception handling, e.g. exception flags}	All groups listed in this Warning should be considered in order to perform a complete search.		
9/3867	. . . . .	{using instruction pipelines}	9/44505	. . . . .	{Configuring for program initiating, e.g. using registry, configuration files}
9/3869	. . . . .	{Implementation aspects, e.g. pipeline latches; pipeline synchronisation and clocking}	9/4451	. . . . .	{User profiles, roaming (user profiles for network-specific applications H04L 67/306)}

- 9/44521 {Dynamic linking or loading; Link editing at or after load time, e.g. Java class loading}
- 9/44526 {Plug-ins; Add-ons}
- 9/44536 {Selecting among different versions}
- 9/44542 {Retargetable}
- 9/44547 {Fat binaries}
- 9/44552 {Conflict resolution, i.e. enabling coexistence of conflicting executables}
- 9/44557 {Code layout in executable memory}
- 9/44563 {Sharing}
- 9/44568 {Immediately runnable code}
- 9/44573 {Execute-in-place [XIP]}
- 9/44578 {Preparing or optimising for loading}
- 9/44584 {Portable applications, i.e. making applications self-contained, e.g. U3 standard}
- 9/44589 {Program code verification, e.g. Java bytecode verification, proof-carrying code ([high-level semantic checks G06F 8/43](#); [testing and debugging software G06F 11/36](#))}
- 9/44594 {Unloading}
- 9/448 . . . Execution paradigms, e.g. implementations of programming paradigms
 - 9/4482 {Procedural}
 - 9/4484 {Executing subprograms}
 - 9/4486 {Formation of subprogram jump address}
 - 9/4488 {Object-oriented}
 - 9/449 {Object-oriented method invocation or resolution}
 - 9/4491 {Optimising based on receiver type}
 - 9/4492 {Inheritance}
 - 9/4493 {Object persistence}
 - 9/4494 {data driven}
 - 9/4496 {Unification in logic programming}
 - 9/4498 {Finite state machines}
- 9/451 . . . Execution arrangements for user interfaces
- 9/452 . . . {Remote windowing, e.g. X-Window System, desktop virtualisation ([protocols for telewriting H04L 67/38](#))}
- 9/453 {Help systems}
- 9/454 {Multi-language systems; Localisation; Internationalisation}
- 9/455 . . . Emulation; Interpretation; Software simulation, e.g. virtualisation or emulation of application or operating system execution engines
 - 9/45504 {Abstract machines for programme code execution, e.g. Java virtual machine [JVM], interpreters, emulators}
 - 9/45508 {Runtime interpretation or emulation, e.g. emulator loops, bytecode interpretation}
 - 9/45512 {Command shells}
 - 9/45516 {Runtime code conversion or optimisation}
 - 9/4552 {Involving translation to a different instruction set architecture, e.g. just-in-time translation in a JVM}
 - 9/45525 {Optimisation or modification within the same instruction set architecture, e.g. HP Dynamo}
 - 9/45529 {Embedded in an application, e.g. JavaScript in a Web browser}
- 9/45533 {Hypervisors; Virtual machine monitors}
- 9/45537 {Provision of facilities of other operating environments, e.g. WINE ([I/O emulation G06F 13/105](#))}
- 9/45541 {Bare-metal, i.e. hypervisor runs directly on hardware}
- 9/45545 {Guest-host, i.e. hypervisor is an application program itself, e.g. VirtualBox}
- 9/4555 {Para-virtualisation, i.e. guest operating system has to be modified}
- 9/45554 {Instruction set architectures of guest OS and hypervisor or native processor differ, e.g. Bochs or VirtualPC on PowerPC MacOS}
- 9/45558 {Hypervisor-specific management and integration aspects}
- 2009/45562 {Creating, deleting, cloning virtual machine instances}
- 2009/45566 {Nested virtual machines}
- 2009/4557 {Distribution of virtual machine instances; Migration and load balancing aspects ([load distribution or balancing G06F 9/505](#), [G06F 9/5083](#); [task migration G06F 9/4856](#))}
- 2009/45575 {Starting, stopping, suspending, resuming virtual machine instances ([program initiating G06F 9/445](#); [task life-cycle in general G06F 9/485](#))}
- 2009/45579 {I/O management (device drivers, storage access) ([internal functioning of device drivers G06F 13/102](#), [loading of device drivers G06F 9/4411](#))}
- 2009/45583 {Memory management, e.g. access, allocation ([memory management in general G06F 12/00](#); [allocation of memory to service a request G06F 9/5016](#))}
- 2009/45587 {Isolation or security of virtual machine instances ([security arrangements G06F 21/00](#))}
- 2009/45591 {Monitoring or debugging support ([monitoring and debugging in general in G06F 11/30](#), [G06F 11/36](#))}
- 2009/45595 {Network integration; enabling network access in virtual machine instances ([network-specific arrangements for supporting networked applications H04L 67/00](#))}
- 9/46 . . . Multiprogramming arrangements
- 9/461 . . . {Saving or restoring of program or task context}
 - 9/462 {with multiple register sets}
- 9/463 . . . {Program control block organisation}
- 9/465 . . . {Distributed object oriented systems ([remote method invocation \[RMI\] G06F 9/548](#))}
- 9/466 . . . {Transaction processing}
- 9/467 . . . {Transactional memory ([G06F 9/528 takes precedence](#))}
- 9/468 . . . {Specific access rights for resources, e.g. using capability register}
- 9/48 . . . Program initiating; Program switching, e.g. by interrupt
- 9/4806 . . . {Task transfer initiation or dispatching}

- 9/4812 {by interrupt, e.g. masked}
- 9/4818 {Priority circuits therefor}
- 9/4825 {Interrupt from clock, e.g. time of day}
- 9/4831 {with variable priority}
- 9/4837 {time dependent}
- 9/4843 {by program, e.g. task dispatcher, supervisor, operating system}
- 9/485 {Task life-cycle, e.g. stopping, restarting, resuming execution ([G06F 9/4881 takes precedence](#))}
- 9/4856 {resumption being on a different machine, e.g. task migration, virtual machine migration ([G06F 9/5088 takes precedence](#))}
- 9/4862 {the task being a mobile agent, i.e. specifically designed to migrate}
- 9/4868 {with creation or replication}
- 9/4875 {with migration policy, e.g. auction, contract negotiation}
- 9/4881 {Scheduling strategies for dispatcher, e.g. round robin, multi-level priority queues}
- 9/4887 {involving deadlines, e.g. rate based, periodic}
- 9/4893 {taking into account power or heat criteria ([power management in computers in general G06F 1/3203](#); [thermal management in computers in general G06F 1/206](#))}
- 9/50 . . . Allocation of resources, e.g. of the central processing unit [CPU]
- 9/5005 {to service a request}
- 9/5011 {the resources being hardware resources other than CPUs, Servers and Terminals}
- 9/5016 {the resource being the memory}
- 9/5022 {Mechanisms to release resources}
- 9/5027 {the resource being a machine, e.g. CPUs, Servers, Terminals}
- 9/5033 {considering data affinity}
- 9/5038 {considering the execution order of a plurality of tasks, e.g. taking priority or time dependency constraints into consideration ([scheduling strategies G06F 9/4881 and subgroups](#))}
- 9/5044 {considering hardware capabilities}
- 9/505 {considering the load}
- 9/5055 {considering software capabilities, i.e. software resources associated or available to the machine}
- 9/5061 {Partitioning or combining of resources}
- 9/5066 {Algorithms for mapping a plurality of inter-dependent sub-tasks onto a plurality of physical CPUs ([mapping at compile time, see G06F 8/451](#))}
- 9/5072 {Grid computing}
- 9/5077 {Logical partitioning of resources; Management or configuration of virtualized resources ([specific details on emulation or internal functioning of virtual machines G06F 9/455](#))}
- 9/5083 {Techniques for rebalancing the load in a distributed system}
- 9/5088 {involving task migration}
- 9/5094 {where the allocation takes into account power or heat criteria ([power management in computers in general G06F 1/3203](#); [thermal management in computers in general G06F 1/206](#))}
- 9/52 . . . Program synchronisation; Mutual exclusion, e.g. by means of semaphores
- 9/522 {Barrier synchronisation}
- 9/524 {Deadlock detection or avoidance}
- 9/526 {Mutual exclusion algorithms}
- 9/528 {by using speculative mechanisms}
- 9/54 . . . Interprogram communication
- 9/541 {via adapters, e.g. between incompatible applications}
- 9/542 {Event management; Broadcasting; Multicasting; Notifications}
- 9/543 {User-generated data transfer, e.g. clipboards, dynamic data exchange [DDE], object linking and embedding [OLE]}
- 9/544 {Buffers; Shared memory; Pipes}
- 9/545 {where tasks reside in different layers, e.g. user- and kernel-space}
- 9/546 {Message passing systems or structures, e.g. queues}
- 9/547 {Remote procedure calls [RPC]; Web services}
- 9/548 {Object oriented; Remote method invocation [RMI] ([non-remote method invocation G06F 9/449](#))}
- 11/00 Error detection; Error correction; Monitoring**
([error detection, correction or monitoring in information storage based on relative movement between record carrier and transducer G11B 20/18](#); [monitoring, i.e. supervising the progress of recording or reproducing G11B 27/36](#); [in static stores G11C 29/00](#))
- NOTE**
In this group the indexing codes of [G06F 1/00](#) - [G06F 15/00](#) are added
- 11/002 . . {protecting against parasitic influences, e.g. noise, temperatures}
- WARNING**
This group is no longer used for the classification of new documents as from January 1, 2011. The documents are classified in [G06F 11/07](#) and subgroups according to the features used for protecting
- 11/004 . . {Error avoidance ([G06F 11/07 and subgroups take precedence](#))}
- 11/006 . . {Identification ([G06F 11/2289 takes precedence](#))}
- 11/008 . . {Reliability or availability analysis}
- 11/07 . . Responding to the occurrence of a fault, e.g. fault tolerance
- 11/0703 . . {Error or fault processing not based on redundancy, i.e. by taking additional measures to deal with the error or fault not making use of redundancy in operation, in hardware, or in data representation}
- 11/0706 . . . {the processing taking place on a specific hardware platform or in a specific software environment}

- 11/0709 {in a distributed system consisting of a plurality of standalone computer nodes, e.g. clusters, client-server systems}
- 11/0712 {in a virtual computing platform, e.g. logically partitioned systems}
- 11/0715 {in a system implementing multitasking ([multitasking per se G06F 9/46](#))}
- 11/0718 {in an object-oriented system}
- 11/0721 {within a central processing unit [CPU]}
- 11/0724 {in a multiprocessor or a multi-core unit ([multiprocessors per se G06F 15/80](#))}
- 11/0727 {in a storage system, e.g. in a DASD or network based storage system ([circuits for error detection or correction within digital recording or reproducing units G11B 20/18; drivers for digital recording or reproducing units G06F 3/06; storage area networks H04L 29/08549](#))}
- 11/073 {in a memory management context, e.g. virtual memory or cache management ([memory management G06F 12/00; testing of static memory units G11C 29/00](#))}
- 11/0733 {in a data processing system embedded in an image processing device, e.g. printer, facsimile, scanner}
- 11/0736 {in functional embedded systems, i.e. in a data processing system designed as a combination of hardware and software dedicated to performing a certain function ([testing or monitoring of automated control systems G05B 23/02](#))}
- 11/0739 {in a data processing system embedded in automotive or aircraft systems}
- 11/0742 {in a data processing system embedded in a mobile device, e.g. mobile phones, handheld devices}
- 11/0745 {in an input/output transactions management context ([input/output processing in general G06F 13/00](#))}
- 11/0748 {in a remote unit communicating with a single-box computer node experiencing an error/fault ([remote testing G06F 11/2294](#))}
- 11/0751 . . . {Error or fault detection not based on redundancy ([power supply failures G06F 1/30; network fault management H04L 41/06](#))}
- 11/0754 {by exceeding limits}
- 11/0757 {by exceeding a time limit, i.e. time-out, e.g. watchdogs}
- 11/076 {by exceeding a count or rate limit, e.g. word- or bit count limit}
- 11/0763 {by bit configuration check, e.g. of formats or tags}
- 11/0766 . . . {Error or fault reporting or storing ([reporting or storing of non-error data G06F 11/30, G06F 11/34](#))}
- 11/0769 {Readable error formats, e.g. cross-platform generic formats, human understandable formats}
- 11/0772 {Means for error signaling, e.g. using interrupts, exception flags, dedicated error registers}
- 11/0775 {Content or structure details of the error report, e.g. specific table structure, specific error fields}
- 11/0778 {Dumping, i.e. gathering error/state information after a fault for later diagnosis}
- 11/0781 {Error filtering or prioritizing based on a policy defined by the user or on a policy defined by a hardware/software module, e.g. according to a severity level}
- 11/0784 {Routing of error reports, e.g. with a specific transmission path or data flow}
- 11/0787 {Storage of error reports, e.g. persistent data storage, storage using memory protection}
- 11/079 . . . {Root cause analysis, i.e. error or fault diagnosis ([in a hardware test environment G06F 11/22; in a software test environment G06F 11/36](#))}
- 11/0793 . . . {Remedial or corrective actions ([by retry G06F 11/1402; recovery from an exception in an instruction pipeline G06F 9/3861; in a network context H04L 29/14](#))}
- 11/0796 . . {Safety measures, i.e. ensuring safe condition in the event of error, e.g. for controlling element}
- 11/08 . . Error detection or correction by redundancy in data representation, e.g. by using checking codes
- 11/085 . . . {using codes with inherent redundancy, e.g. n-out-of-m codes}
- 11/10 . . . Adding special bits or symbols to the coded information, e.g. parity check, casting out 9's or 11's
- 11/1004 {to protect a block of data words, e.g. CRC or checksum ([G06F 11/1076 takes precedence; security arrangements for protecting computers or computer systems against unauthorized activity G06F 21/00](#))}
- 11/1008 {in individual solid state devices ([G06F 11/1004 takes precedence](#))}
- 11/1012 {using codes or arrangements adapted for a specific type of error ([G06F 11/1048 takes precedence](#))}
- 11/1016 {Error in accessing a memory location, i.e. addressing error}
- 11/102 {Error in check bits}
- 11/1024 {Identification of the type of error}
- 11/1028 {Adjacent errors, e.g. error in n-bit (n>1) wide storage units, i.e. package error}
- 11/1032 {Simple parity}
- 11/1036 {Unidirectional errors}
- 11/104 {using arithmetic codes, i.e. codes which are preserved during operation, e.g. modulo 9 or 11 check}
- 11/1044 {with specific ECC/EDC distribution}
- 11/1048 {using arrangements adapted for a specific error detection or correction feature}
- 11/1052 {Bypassing or disabling error detection or correction}
- 11/1056 {Updating check bits on partial write, i.e. read/modify/write}
- 11/106 {Correcting systematically all correctable errors, i.e. scrubbing}
- 11/1064 {in cache or content addressable memories}
- 11/1068 {in sector programmable memories, e.g. flash disk ([G06F 11/1072 takes precedence](#))}
- 11/1072 {in multilevel memories}

- 11/1076 {Parity data used in redundant arrays of independent storages, e.g. in RAID systems}
- 11/108 {Parity data distribution in semiconductor storages, e.g. in SSD}
- 11/1084 {Degraded mode, e.g. caused by single or multiple storage removals or disk failures}
- 11/1088 {Reconstruction on already foreseen single or plurality of spare disks}
- 11/1092 {Rebuilding, e.g. when physically replacing a failing disk}
- 11/1096 {Parity calculation or recalculation after configuration or reconfiguration of the system}
- 11/14 . . Error detection or correction of the data by redundancy in operation ([G06F 11/16](#) takes precedence)
- 11/1402 . . . {Saving, restoring, recovering or retrying}
- 11/1405 {at machine instruction level}
- 11/1407 {Checkpointing the instruction stream}
- 11/141 {for bus or memory accesses}
- 11/1415 {at system level}
- 11/1417 {Boot up procedures}
- 11/142 {Reconfiguring to eliminate the error (group management mechanisms in a peer-to-peer network [H04L 67/1044](#))}
- 11/1423 {by reconfiguration of paths}
- 11/1425 {by reconfiguration of node membership}
- 11/1428 {with loss of hardware functionality}
- 11/143 {with loss of software functionality}
- 11/1433 {during software upgrading}
- 11/1435 {using file system or storage system metadata}
- 11/1438 {Restarting or rejuvenating}
- 11/1441 {Resetting or repowering}
- 11/1443 {Transmit or communication errors}
- 11/1446 {Point-in-time backing up or restoration of persistent data}
- 11/1448 {Management of the data involved in backup or backup restore}
- 11/1451 {by selection of backup contents}
- 11/1453 {using de-duplication of the data}
- 11/1456 {Hardware arrangements for backup}
- 11/1458 {Management of the backup or restore process}
- 11/1461 {Backup scheduling policy}
- 11/1464 {for networked environments}
- 11/1466 {to make the backup process non-disruptive}
- 11/1469 {Backup restoration techniques}
- 11/1471 {involving logging of persistent data for recovery}
- 11/1474 {in transactions ([G06F 16/20](#) takes precedence)}
- 11/1476 . . . {in neural networks}
- 11/1479 . . . {Generic software techniques for error detection or fault masking}
- 11/1482 {by means of middleware or OS functionality}
- 11/1484 {involving virtual machines}
- 11/1487 {using N-version programming}
- 11/1489 {through recovery blocks}
- 11/1492 {by run-time replication performed by the application software}
- 11/1494 {N-modular type}
- 11/1497 . . . {Details of time redundant execution on a single processing unit}
- 11/16 . . Error detection or correction of the data by redundancy in hardware
- 11/1604 . . . {where the fault affects the clock signals of a processing unit and the redundancy is at or within the level of clock signal generation hardware}
- 11/1608 . . . {Error detection by comparing the output signals of redundant hardware ([G06F 11/1629](#), [G06F 11/1666](#) take precedence; error detection or correction in information storage based on relative movement between record carrier and transducer [G11B 20/18](#); checking static stores for correct operation [G11C 29/00](#); for logic circuits [H03K 19/003](#), [H03K 19/007](#); for pulse counters or frequency dividers [H03K 21/40](#))}
- 11/1612 {where the redundant component is persistent storage}
- 11/1616 {where the redundant component is an I/O device or an adapter therefor}
- 11/162 {Displays}
- 11/1625 {in communications, e.g. transmission, interfaces}
- 11/1629 . . . {Error detection by comparing the output of redundant processing systems}
- 11/1633 {using mutual exchange of the output between the redundant processing components}
- 11/1637 {using additional compare functionality in one or some but not all of the redundant processing components}
- 11/1641 {where the comparison is not performed by the redundant processing components}
- 11/1645 {and the comparison itself uses redundant hardware}
- 11/165 {with continued operation after detection of the error}
- 11/1654 {where the output of only one of the redundant processing components can drive the attached hardware, e.g. memory or I/O}
- 11/1658 . . . {Data re-synchronization of a redundant component, or initial sync of replacement, additional or spare unit}
- 11/1662 {the resynchronized component or unit being a persistent storage device (re-synchronization of failed mirror storage [G06F 11/2082](#); rebuild or reconstruction of parity RAID storage [G06F 11/1008](#))}
- 11/1666 . . . {where the redundant component is memory or memory area}
- 11/167 {Error detection by comparing the memory output}
- 11/1675 . . . {Temporal synchronisation or re-synchronisation of redundant processing components}
- 11/1679 {at clock signal level}
- 11/1683 {at instruction level}
- 11/1687 {at event level, e.g. by interrupt or result of polling}
- 11/1691 {using a quantum}

- 11/1695 . . . {which are operating with time diversity}
- 11/18 . . . using passive fault-masking of the redundant circuits ({error detection by comparing the output of redundant processing systems with continued operation after detection of the error [G06F 11/165](#)})
- 11/181 {Eliminating the failing redundant component}
- 11/182 {based on mutual exchange of the output between redundant processing components}
- 11/183 {by voting, the voting not being performed by the redundant components}
- 11/184 {where the redundant components implement processing functionality}
- 11/185 {and the voting is itself performed redundantly}
- 11/186 {Passive fault masking when reading multiple copies of the same data}
- 11/187 {Voting techniques}
- 11/188 {where exact match is not required}
- 11/20 . . . using active fault-masking, e.g. by switching out faulty elements or by switching in spare elements
- 11/2002 {where interconnections or communication control functionality are redundant (flexible arrangements for bus networks involving redundancy [H04L 12/40176](#))}
- 11/2005 {using redundant communication controllers}
- 11/2007 {using redundant communication media}
- 11/201 {between storage system components}
- 11/2012 {and using different communication protocols}
- 11/2015 {Redundant power supplies (power supply failure [G06F 1/30](#))}
- 11/2017 {where memory access, memory control or I/O control functionality is redundant (redundant communication control functionality [G06F 11/2005](#); redundant storage control functionality [G06F 11/2089](#))}
- 11/202 {where processing functionality is redundant (redundant communication control functionality [G06F 11/2005](#), redundant storage control functionality [G06F 11/2089](#))}
- 11/2023 {Failover techniques}
- 11/2025 {using centralised failover control functionality}
- 11/2028 {eliminating a faulty processor or activating a spare}
- 11/203 {using migration}
- 11/2033 {switching over of hardware resources}
- 11/2035 {without idle spare hardware}
- 11/2038 {with a single idle spare processing component}
- 11/2041 {with more than one idle spare processing component}
- 11/2043 {where the redundant components share a common memory address space}
- 11/2046 {where the redundant components share persistent storage ([G06F 11/2043](#) takes precedence)}
- 11/2048 {where the redundant components share neither address space nor persistent storage}
- 11/2051 {in regular structures}
- 11/2053 {where persistent mass storage functionality or persistent mass storage control functionality is redundant (error detection or correction in information storage based on relative movement between record carrier and transducer [G11B 20/18](#))}
- 11/2056 {by mirroring}
- 11/2058 {using more than 2 mirrored copies}
- 11/2061 {combined with de-clustering of data}
- 11/2064 {while ensuring consistency}
- 11/2066 {Optimisation of the communication load}
- 11/2069 {Management of state, configuration or failover}
- 11/2071 {using a plurality of controllers}
- 11/2074 {Asynchronous techniques}
- 11/2076 {Synchronous techniques}
- 11/2079 {Bidirectional techniques}
- 11/2082 {Data synchronisation}
- 11/2084 {on the same storage unit}
- 11/2087 {with a common controller}
- 11/2089 {Redundant storage control functionality}
- 11/2092 {Techniques of failing over between control units}
- 11/2094 {Redundant storage or storage space ([G06F 11/2056](#) takes precedence)}
- 11/2097 {maintaining the standby controller/processing unit updated (initialisation or re-synchronisation thereof [G06F 11/1658](#) and subgroups)}
- 11/22 . . . Detection or location of defective computer hardware by testing during standby operation or during idle time, e.g. start-up testing
- 11/2205 . . . {using arrangements specific to the hardware being tested}
- 11/221 {to test buses, lines or interfaces, e.g. stuck-at or open line faults}
- 11/2215 {to test error correction or detection circuits}
- 11/2221 {to test input/output devices or peripheral units}
- 11/2226 {to test ALU}
- 11/2231 {to test interrupt circuits}
- 11/2236 {to test CPU or processors}
- 11/2242 {in multi-processor systems, e.g. one processor becoming the test master ([G06F 11/2736](#) takes precedence)}
- 11/2247 . . . {Verification or detection of system hardware configuration}
- 11/2252 . . . {using fault dictionaries}
- 11/2257 . . . {using expert systems}
- 11/2263 . . . {using neural networks}
- 11/2268 . . . {Logging of test results}
- 11/2273 . . . {Test methods}
- 2011/2278 {Power-On Test, e.g. POST}
- 11/2284 . . . {by power-on test, e.g. power-on self test [POST]}
- 11/2289 . . . {by configuration test}
- 11/2294 . . . {by remote test}
- 11/24 . . . Marginal checking {or other specified testing methods not covered by [G06F 11/26](#), e.g. race tests}
- 11/25 . . . Testing of logic operation, e.g. by logic analysers

- 11/26 . . Functional testing
- 11/261 . . . {by simulating additional hardware, e.g. fault simulation}
- 11/263 . . . Generation of test inputs, e.g. test vectors, patterns or sequences {; with adaptation of the tested hardware for testability with external testers}
- 11/2635 {using a storage for the test inputs, e.g. test ROM, script files}
- 11/267 . . . Reconfiguring circuits for testing, e.g. LSSD, partitioning
- 11/27 . . . Built-in tests
- 11/273 . . . Tester hardware, i.e. output processing circuits {[\(G06F 11/263 takes precedence\)](#)}
- 11/2733 {Test interface between tester and unit under test}
- 11/2736 {using a dedicated service processor for test}
- 11/277 with comparison between actual response and known fault-free response
- 11/28 . by checking the correct order of processing [\(G06F 11/08 - G06F 11/26 take precedence; monitoring patterns of pulse trains H03K 5/19\)](#)
- 11/30 . Monitoring
- 11/3003 . . {Monitoring arrangements specially adapted to the computing system or computing system component being monitored}
- 11/3006 . . . {where the computing system is distributed, e.g. networked systems, clusters, multiprocessor systems [\(multiprogramming arrangements G06F 9/46; allocation of resources G06F 9/50\)](#)}
- 11/301 . . . {where the computing system is a virtual computing platform, e.g. logically partitioned systems [\(virtual machines G06F 9/45533; logical partitioning of resources G06F 9/5077\)](#)}
- 11/3013 . . . {where the computing system is an embedded system, i.e. a combination of hardware and software dedicated to perform a certain function in mobile devices, printers, automotive or aircraft systems [\(testing or monitoring of control systems or parts thereof G05B 23/02\)](#)}
- 11/3017 . . . {where the computing system is implementing multitasking [\(multiprogramming arrangements G06F 9/46; allocation of resources G06F 9/50\)](#)}
- 11/302 . . . {where the computing system component is a software system}
- 11/3024 . . . {where the computing system component is a central processing unit [CPU]}
- 11/3027 . . . {where the computing system component is a bus}
- 11/3031 . . . {where the computing system component is a motherboard or an expansion card}
- 11/3034 . . . {where the computing system component is a storage system, e.g. DASD based or network based [\(digital recording or reproducing G11B 20/18; digital input from or digital output to record carriers G06F 3/06; arrangements and networking functions for distributed storage of data in a network H04L 29/08549\)](#)}
- 11/3037 . . . {where the computing system component is a memory, e.g. virtual memory, cache [\(accessing, addressing or allocating within memory systems or architectures G06F 12/00; checking stores for correct operation G11C 29/00\)](#)}
- 11/3041 . . . {where the computing system component is an input/output interface [\(interconnection of, or transfer of information or other signals between, memories, input/output devices or central processing units G06F 13/00\)](#)}
- 11/3044 . . . {where the computing system component is the mechanical casing of the computing system}
- 11/3048 . . . {where the topology of the computing system or computing system component explicitly influences the monitoring activity, e.g. serial, hierarchical systems}
- 11/3051 . . {Monitoring arrangements for monitoring the configuration of the computing system or of the computing system component, e.g. monitoring the presence of processing resources, peripherals, I/O links, software programs [\(verification or detection of system hardware configuration G06F 11/2247\)](#)}
- 11/3055 . . {Monitoring arrangements for monitoring the status of the computing system or of the computing system component, e.g. monitoring if the computing system is on, off, available, not available [\(error or fault processing without redundancy G06F 11/0703; error detection or correction by redundancy in data representation G06F 11/08; error detection or correction by redundancy in operation G06F 11/14; error detection or correction by redundancy in hardware G06F 11/16\)](#)}
- 11/3058 . . {Monitoring arrangements for monitoring environmental properties or parameters of the computing system or of the computing system component, e.g. monitoring of power, currents, temperature, humidity, position, vibrations [\(thermal management in cooling arrangements of a computing system G06F 1/206\)](#)}
- 11/3062 . . . {where the monitored property is the power consumption [\(power management in a computing system G06F 1/3203\)](#)}
- 11/3065 . . {Monitoring arrangements determined by the means or processing involved in reporting the monitored data [\(error or fault reporting or logging G06F 11/0766\)](#)}
- 11/3068 . . . {where the reporting involves data format conversion}
- 11/3072 . . . {where the reporting involves data filtering, e.g. pattern matching, time or event triggered, adaptive or policy-based reporting}
- 11/3075 {the data filtering being achieved in order to maintain consistency among the monitored data, e.g. ensuring that the monitored data belong to the same timeframe, to the same system or component}
- 11/3079 {the data filtering being achieved by reporting only the changes of the monitored data}
- 11/3082 {the data filtering being achieved by aggregating or compressing the monitored data}
- 11/3086 . . . {where the reporting involves the use of self describing data formats, i.e. metadata, markup languages, human readable formats}

- 11/3089 . . . {Monitoring arrangements determined by the means or processing involved in sensing the monitored data, e.g. interfaces, connectors, sensors, probes, agents ([software debugging using additional hardware using a specific debug interface G06F 11/3656](#); [performance evaluation by tracing or monitoring G06F 11/3466](#))}
- 11/3093 . . . {Configuration details thereof, e.g. installation, enabling, spatial arrangement of the probes}
- 11/3096 . . . {wherein the means or processing minimize the use of computing system or of computing system component resources, e.g. non-intrusive monitoring which minimizes the probe effect: sniffing, intercepting, indirectly deriving the monitored data from other directly available data}
- 11/32 . . with visual {or acoustical} indication of the functioning of the machine
- 11/321 . . . {Display for diagnostics, e.g. diagnostic result display, self-test user interface}
- 11/322 {Display of waveforms, e.g. of logic analysers ([G06F 11/323 takes precedence](#))}
- 11/323 . . . {Visualisation of programs or trace data}
- 11/324 . . . {Display of status information}
- 11/325 {by lamps or LED's}
- 11/326 {for error or online/offline status}
- 11/327 {Alarm or error message display}
- 11/328 {Computer systems status display ([G06F 11/327 takes precedence](#))}
- 11/34 . . Recording or statistical evaluation of computer activity, e.g. of down time, of input/output operation ; Recording or statistical evaluation of user activity, e.g. usability assessment}
 - 11/3404 . . . {for parallel or distributed programming}
 - 11/3409 . . . {for performance assessment}
 - 11/3414 {Workload generation, e.g. scripts, playback}
 - 11/3419 {by assessing time}
 - 11/3423 {where the assessed time is active or idle time}
 - 11/3428 {Benchmarking}
 - 11/3433 {for load management ([allocation of a server based on load conditions G06F 9/505](#); [load rebalancing G06F 9/5083](#); [redistributing the load in a network by a load balancer H04L 67/1029](#))}
- 11/3438 . . . {monitoring of user actions ([checking the network activity of the user for network-specific applications H04L 67/22](#))}
- 11/3442 . . . {for planning or managing the needed capacity}
- 11/3447 . . . {Performance evaluation by modeling}
- 11/3452 . . . {Performance evaluation by statistical analysis}
- 11/3457 . . . {Performance evaluation by simulation}
- 11/3461 {Trace driven simulation}
- 11/3466 . . . {Performance evaluation by tracing or monitoring}
- 11/3471 {Address tracing}
- 11/3476 {Data logging ([G06F 11/14](#), [G06F 11/2205 take precedence](#))}
- 11/348 {Circuit details, i.e. tracer hardware}
- 11/3485 {for I/O devices}
- 11/349 {for interfaces, buses}
- 11/3495 {for systems}
- 11/36 . . Preventing errors by testing or debugging software
- 11/3604 . . . {Software analysis for verifying properties of programs ([byte-code verification G06F 9/44589](#))}
- 11/3608 . . . {using formal methods, e.g. model checking, abstract interpretation ([theorem proving G06N 5/006](#))}
- 11/3612 . . . {by runtime analysis ([performance monitoring G06F 11/3466](#))}
- 11/3616 . . . {using software metrics}
- 11/362 . . . {Software debugging}
- 11/3624 . . . {by performing operations on the source code, e.g. via a compiler}
- 11/3628 . . . {of optimised code ([optimisation G06F 8/443](#))}
- 11/3632 . . . {of specific synchronisation aspects}
- 11/3636 . . . {by tracing the execution of the program}
- 11/364 {tracing values on a bus}
- 11/3644 . . . {by instrumenting at runtime}
- 11/3648 . . . {using additional hardware}
- 11/3652 {in-circuit-emulation [ICE] arrangements}
- 11/3656 {using a specific debug interface}
- 11/366 . . . {using diagnostics ([G06F 11/0703 takes precedence](#))}
- 11/3664 . . {Environments for testing or debugging software}
- 11/3668 . . {Software testing ([software testing in telephone exchanges H04M 3/242](#), [testing of hardware G06F 11/22](#))}
- 11/3672 . . . {Test management}
- 11/3676 {for coverage analysis}
- 11/368 {for test version control, e.g. updating test cases to a new software version}
- 11/3684 {for test design, e.g. generating new test cases}
- 11/3688 {for test execution, e.g. scheduling of test suites}
- 11/3692 {for test results analysis}
- 11/3696 . . . {Methods or tools to render software testable}
- 12/00 Accessing, addressing or allocating within memory systems or architectures (digital input from, or digital output to record carriers, e.g. to disk storage units, [G06F 3/06](#))**
- 12/02 . . Addressing or allocation; Relocation ([program address sequencing G06F 9/00](#); [arrangements for selecting an address in a digital store G11C 8/00](#))
- 12/0207 . . {with multidimensional access, e.g. row/column, matrix}
- 12/0215 . . {with look ahead addressing means}
- 12/0223 . . {User address space allocation, e.g. contiguous or non contiguous base addressing}
- 12/023 . . . {Free address space management}
- 12/0238 {Memory management in non-volatile memory, e.g. resistive RAM or ferroelectric memory}
- 12/0246 {in block erasable memory, e.g. flash memory}
- 12/0253 {Garbage collection, i.e. reclamation of unreferenced memory}
- 12/0261 {using reference counting}
- 12/0269 {Incremental or concurrent garbage collection, e.g. in real-time systems ([G06F 12/0261 takes precedence](#))}
- 12/0276 {Generational garbage collection}

12/0284	. . . {Multiple user address space allocation, e.g. using different base addresses (interprocessor communication G06F 15/163)}	12/0828	. . . . . {with concurrent directory accessing, i.e. handling multiple concurrent coherency transactions}
12/0292	. . . {using tables or multilevel address translation means (G06F 12/023 takes precedence; address translation in virtual memory systems G06F 12/10)}	12/0831	. . . . . using a bus scheme, e.g. with bus monitoring or watching means
12/04	. . Addressing variable-length words or parts of words	12/0833	. . . . . {in combination with broadcast means (e.g. for invalidation or updating)}
12/06	. . Addressing a physical block of locations, e.g. base addressing, module addressing, memory dedication (G06F 12/08 takes precedence)	12/0835	. . . . . {for main memory peripheral accesses (e.g. I/O or DMA)}
NOTE		12/0837	. . . . . with software control, e.g. non-cacheable data
This group is limited to Module addressing or allocation; base addressing is classified in G06F 12/0223 .		12/084	. . . . . with a shared cache
12/0607	. . . {Interleaved addressing}	12/0842	. . . . . for multiprocessing or multitasking
12/0615	. . . {Address space extension}	12/0844	. . . . . Multiple simultaneous or quasi-simultaneous cache accessing
12/0623	. . . . {for memory modules}	12/0846	. . . . . Cache with multiple tag or data arrays being simultaneously accessible
12/063	. . . . {for I/O modules, e.g. memory mapped I/O (I/O protocol G06F 13/42)}	12/0848	. . . . . {Partitioned cache, e.g. separate instruction and operand caches}
12/0638	. . . {Combination of memories, e.g. ROM and RAM such as to permit replacement or supplementing of words in one module by words in another module (address formation of the next microinstruction G06F 9/26 ; masking faults in memories by using spares or by reconfiguring G11C 29/70)}	12/0851	. . . . . {Cache with interleaved addressing}
12/0646	. . . {Configuration or reconfiguration}	WARNING	
12/0653	. . . . {with centralised address assignment}	Group G06F 12/0851 is impacted by reclassification into group G06F 12/0886 .	
12/0661	. . . . . {and decentralised selection}	Groups G06F 12/0851 and G06F 12/0886 should be considered in order to perform a complete search.	
12/0669	. . . . . {with decentralised address assignment}	12/0853	. . . . . Cache with multiport tag or data arrays
12/0676	. . . . . {the address being position dependent}	12/0855	. . . . . Overlapped cache accessing, e.g. pipeline (G06F 12/0846 takes precedence)
12/0684	. . . . . {with feedback, e.g. presence or absence of unit detected by addressing, overflow detection}	12/0857	. . . . . {by multiple requestors}
12/0692	. . . . . {Multiconfiguration, e.g. local and global addressing}	12/0859	. . . . . {with reload from main memory}
12/08	. . in hierarchically structured memory systems, e.g. virtual memory systems	12/0862	. . . . . with prefetch
12/0802	. . . Addressing of a memory level in which the access to the desired data or data block requires associative addressing means, e.g. caches	12/0864	. . . . . using pseudo-associative means, e.g. set-associative or hashing
12/0804	. . . . with main memory updating (G06F 12/0806 takes precedence)	12/0866	. . . . . for peripheral storage systems, e.g. disk cache
12/0806	. . . . Multiuser, multiprocessor or multiprocessing cache systems	12/0868	. . . . . Data transfer between cache memory and other subsystems, e.g. storage devices or host systems
12/0808	. . . . . with cache invalidating means (G06F 12/0815 takes precedence)	12/0871	. . . . . Allocation or management of cache space
12/0811	. . . . . with multilevel cache hierarchies	12/0873	. . . . . Mapping of cache memory to specific storage devices or parts thereof
12/0813	. . . . . with a network or matrix configuration	12/0875	. . . . . with dedicated cache, e.g. instruction or stack
12/0815	. . . . . Cache consistency protocols	12/0877	. . . . . Cache access modes
12/0817	. . . . . using directory methods	12/0879	. . . . . Burst mode
12/082	. . . . . {Associative directories (G06F 12/0822 takes precedence)}	12/0882	. . . . . Page mode
12/0822	. . . . . {Copy directories (local copy tags for implementing a bus snooping protocol G06F 12/0831)}	12/0884	. . . . . Parallel mode, e.g. in parallel with main memory or CPU
12/0824	. . . . . {Distributed directories, e.g. linked lists of caches}	12/0886	. . . . . Variable-length word access
12/0826	. . . . . {Limited pointers directories; State-only directories without pointers}	WARNING	
		Group G06F 12/0886 is incomplete pending reclassification of documents from group G06F 12/0851 .	
		Groups G06F 12/0851 and G06F 12/0886 should be considered in order to perform a complete search.	
		12/0888	. . . . . using selective caching, e.g. bypass
		12/0891	. . . . . using clearing, invalidating or resetting means

- 12/0893 Caches characterised by their organisation or structure
- 12/0895 of parts of caches, e.g. directory or tag array
- 12/0897 with two or more cache hierarchy levels (with multilevel cache hierarchies [G06F 12/0811](#))
- 12/10 . . . Address translation
- 12/1009 using page tables, e.g. page table structures
- 12/1018 involving hashing techniques, e.g. inverted page tables
- 12/1027 using associative or pseudo-associative address translation means, e.g. translation look-aside buffer [TLB]
- 12/1036 for multiple virtual address spaces, e.g. segmentation ([G06F 12/1045](#) takes precedence)
WARNING
 Group [G06F 12/1036](#) is incomplete pending reclassification of documents from group [G06F 12/109](#).
 Groups [G06F 12/109](#) and [G06F 12/1036](#) should be considered in order to perform a complete search.
- 12/1045 associated with a data cache
- 12/1054 {the data cache being concurrently physically addressed}
- 12/1063 {the data cache being concurrently virtually addressed}
- 12/1072 Decentralised address translation, e.g. in distributed shared memory systems
- 12/1081 for peripheral access to main memory, e.g. direct memory access [DMA]
- 12/109 for multiple virtual address spaces, e.g. segmentation ([G06F 12/1036](#) takes precedence)
WARNING
 Group [G06F 12/109](#) is impacted by reclassification into group [G06F 12/1036](#).
 Groups [G06F 12/109](#) and [G06F 12/1036](#) should be considered in order to perform a complete search.
- 12/12 . . . Replacement control
- 12/121 using replacement algorithms
- 12/122 of the least frequently used [LFU] type, e.g. with individual count value
- 12/123 with age lists, e.g. queue, most recently used [MRU] list or least recently used [LRU] list
- 12/124 {being minimized, e.g. non MRU}
- 12/125 {being generated by decoding an array or storage}
- 12/126 with special data handling, e.g. priority of data or instructions, handling errors or pinning
- 12/127 using additional replacement algorithms
- 12/128 adapted to multidimensional cache systems, e.g. set-associative, multicache, multiset or multilevel
- 12/14 . . . Protection against unauthorised use of memory {or access to memory}
- 12/1408 . . {by using cryptography (for digital transmission [H04L 9/00](#))}
- 12/1416 . . {by checking the object accessibility, e.g. type of access defined by the memory independently of subject rights ([G06F 12/1458](#) takes precedence)}
- 12/1425 . . . {the protection being physical, e.g. cell, word, block}
- 12/1433 {for a module or a part of a module}
- 12/1441 {for a range}
- 12/145 . . . {the protection being virtual, e.g. for virtual blocks or segments before a translation mechanism}
- 12/1458 . . {by checking the subject access rights}
- 12/1466 . . . {Key-lock mechanism}
- 12/1475 {in a virtual system, e.g. with translation means}
- 12/1483 . . . {using an access-table, e.g. matrix or list}
- 12/1491 . . . {in a hierarchical protection system, e.g. privilege levels, memory rings}
- 12/16 . . . Protection against loss of memory contents {contains no material, see [G06F 11/00](#)}
- 13/00 Interconnection of, or transfer of information or other signals between, memories, input/output devices or central processing units (interface circuits for specific input/output devices [G06F 3/00](#); multiprocessor systems [G06F 15/16](#) {multiprogram control therefor [G06F 9/46](#)})**
- 13/10 . . . Program control for peripheral devices ([G06F 13/14](#) - [G06F 13/42](#) take precedence)
- 13/102 . . {where the programme performs an interfacing function, e.g. device driver ([G06F 13/105](#) takes precedence; scheduling within device drivers [G06F 9/52](#); contention policies within device drivers [G06F 9/4881](#))}
- 13/105 . . {where the programme performs an input/output emulation function}
- 13/107 . . . {Terminal emulation}
- 13/12 . . . using hardware independent of the central processor, e.g. channel or peripheral processor
- 13/122 . . . {where hardware performs an I/O function other than control of data transfer}
- 13/124 . . . {where hardware is a sequential transfer control unit, e.g. microprocessor, peripheral processor or state-machine}
- 13/126 {and has means for transferring I/O instructions and statuses between control unit and main processor}
- 13/128 {for dedicated transfers to a network (for protocol converters [G06F 13/387](#))}
- 13/14 . . . Handling requests for interconnection or transfer
- 13/16 . . . for access to memory bus ([G06F 13/28](#) takes precedence)
- 13/1605 . . . {based on arbitration (arbitration in handling access to a common bus or bus system [G06F 13/36](#))}
- 13/161 {with latency improvement}
- 13/1615 {using a concurrent pipeline structure}
- 13/1621 {by maintaining request order}
- 13/1626 {by reordering requests}
- 13/1631 {through address comparison}
- 13/1636 {using refresh}
- 13/1642 {with request queuing}
- 13/1647 {with interleaved bank access}

- 13/1652 {in a multiprocessor architecture
(interprocessor communication using
common memory [G06F 15/167](#))}
- 13/1657 {Access to multiple memories}
- 13/1663 {Access to shared memory}
- 13/1668 . . . {Details of memory controller}
- 13/1673 {using buffers}
- 13/1678 {using bus width}
- 13/1684 {using multiple buses}
- 13/1689 {Synchronisation and timing concerns
(synchronisation on a memory bus
[G06F 13/4234](#))}
- 13/1694 {Configuration of memory controller to
different memory types}
- 13/18 . . . based on priority control ([G06F 13/1605](#) takes
precedence)
- 13/20 . . for access to input/output bus
- 13/22 . . . using successive scanning, e.g. polling
([G06F 13/24](#) takes precedence)
- 13/225 {with priority control}
- 13/24 . . . using interrupt ([G06F 13/32](#) takes precedence)
- 13/26 with priority control
- 13/28 . . . using burst mode transfer, e.g. direct memory
access {DMA}, cycle steal ([G06F 13/32](#) takes
precedence)
- 13/282 {Cycle stealing DMA ([G06F 13/30](#) takes
precedence)}
- 13/285 {Halt processor DMA ([G06F 13/30](#) takes
precedence)}
- 13/287 {Multiplexed DMA ([G06F 13/30](#) takes
precedence)}
- 13/30 with priority control
- 13/32 . . . using combination of interrupt and burst mode
transfer
- 13/34 with priority control
- 13/36 . . for access to common bus or bus system
- 13/362 . . . with centralised access control
- 13/3625 {using a time dependent access}
- 13/364 using independent requests or grants, e.g.
using separated request and grant lines
- 13/366 using a centralised polling arbiter
- 13/368 . . . with decentralised access control
- 13/37 using a physical-position-dependent priority,
e.g. daisy chain, round robin or token passing
- 13/372 using a time-dependent priority, e.g.
individually loaded time counters or time slot
- 13/374 using a self-select method with individual
priority code comparator
- 13/376 using a contention resolving method, e.g.
collision detection, collision avoidance
- 13/378 using a parallel poll method
- 13/38 . . Information transfer, e.g. on bus ([G06F 13/14](#) takes
precedence)
- 13/382 . . {using universal interface adapter}
- 13/385 . . . {for adaptation of a particular data processing
system to different peripheral devices}
- 13/387 . . . {for adaptation of different data processing
systems to different peripheral devices, e.g.
protocol converters for incompatible systems,
open system}
- 13/40 . . Bus structure {(for computer networks
[G06F 15/163](#); for optical bus networks
[H04B 10/25](#))}
- 13/4004 . . . {Coupling between buses}
- 13/4009 {with data restructuring}
- 13/4013 {with data re-ordering, e.g. Endian
conversion}
- 13/4018 {with data-width conversion}
- 13/4022 {using switching circuits, e.g. switching
matrix, connection or expansion network
([G06F 13/4009](#) takes precedence)}
- 13/4027 {using bus bridges ([G06F 13/4022](#) takes
precedence)}
- 13/4031 {with arbitration}
- 13/4036 {and deadlock prevention}
- 13/404 {with address mapping}
- 13/4045 {where the bus bridge performs an
extender function}
- 13/405 {where the bridge performs a
synchronising function}
- 13/4054 {where the function is bus cycle
extension, e.g. to meet the timing
requirements of the target bus}
- 13/4059 {where the synchronisation uses buffers,
e.g. for speed matching between buses}
- 13/4063 . . . {Device-to-bus coupling}
- 13/4068 {Electrical coupling}
- 13/4072 {Drivers or receivers ([G06F 13/4086](#) takes
precedence; for multistate logic circuits
[H03K 19/0002](#))}
- 13/4077 {Precharging or discharging}
- 13/4081 {Live connection to bus, e.g. hot-plugging
(current or voltage limitation during live
insertion [H02H 9/004](#))}
- 13/4086 {Bus impedance matching, e.g.
termination}
- 13/409 {Mechanical coupling ([back panels](#)
[H05K 7/1438](#))}
- 13/4095 {in incremental bus architectures, e.g. bus
stacks}
- 13/42 . . Bus transfer protocol, e.g. handshake;
Synchronisation
- 13/4204 . . . {on a parallel bus}
- 13/4208 {being a system bus, e.g. VME bus,
Futurebus, Multibus}
- 13/4213 {with asynchronous protocol}
- 13/4217 {with synchronous protocol}
- 13/4221 {being an input/output bus, e.g. ISA bus,
EISA bus, PCI bus, SCSI bus}
- 13/4226 {with asynchronous protocol}
- 13/423 {with synchronous protocol}
- 13/4234 {being a memory bus}
- 13/4239 {with asynchronous protocol}
- 13/4243 {with synchronous protocol}
- 13/4247 . . . {on a daisy chain bus}
- 13/4252 {using a handshaking protocol}
- 13/4256 {using a clocked protocol}
- 13/426 {using an embedded synchronisation, e.g.
Firewire bus, Fibre Channel bus, SSA bus}
- 13/4265 . . . {on a point to point bus ([G06F 13/4247](#),
[G06F 13/4282](#) take precedence)}
- 13/4269 {using a handshaking protocol, e.g.
Centronics connection}
- 13/4273 {using a clocked protocol}
- 13/4278 {using an embedded synchronisation}

- 13/4282 . . . {on a serial bus, e.g. I2C bus, SPI bus (on daisy chain buses [G06F 13/4247](#))}
- 13/4286 . . . {using a handshaking protocol, e.g. RS232C link}
- 13/4291 . . . {using a clocked protocol}
- 13/4295 . . . {using an embedded synchronisation}
- 15/00** **Digital computers in general (details [G06F 1/00 – G06F 13/00](#)); Data processing equipment in general**
- 15/02 . manually operated with input through keyboard and computation using a built-in program, e.g. pocket calculators
- 15/0208 . . {for combination with other devices having a different main function, e.g. watches, pens}
- 15/0216 . . {Constructional details or arrangements}
- 15/0225 . . {User interface arrangements, e.g. keyboard, display; Interfaces to other computer systems}
- 15/0233 . . . {with printing provisions}
- 15/0241 . . {of the IC-card-like type}
- 15/025 . . {adapted to a specific application}
- 15/0258 . . . {for unit conversion}
- 15/0266 . . . {for time management, e.g. calendars, diaries}
- 15/0275 . . . {for measuring}
- 15/0283 . . . {for data storage and retrieval}
- 15/0291 . . . {for reading, e.g. e-books (constructional details of portable computers [G06F 1/1613](#))}
- 15/04 . programmed simultaneously with the introduction of data to be processed, e.g. on the same record carrier
- 15/08 . using a plugboard for programming
- 15/10 . . Tabulators
- 15/12 . . . having provision for both printed and punched output
- 15/14 . . Calculating-punches
- 15/16 . Combinations of two or more digital computers each having at least an arithmetic unit, a program unit and a register, e.g. for a simultaneous processing of several programs {(coordinating program control therefor [G06F 9/52](#); in regulating and control system [G05B](#))}
- 15/161 . . {Computing infrastructure, e.g. computer clusters, blade chassis or hardware partitioning (casings, cabinets, racks or drawers for data centers [H05K 5/00](#))}
- 15/163 . . Interprocessor communication
- 15/167 . . . using a common memory, e.g. mailbox
- 15/17 . . . using an input/output type connection, e.g. channel, I/O port
- 15/173 . . . using an interconnection network, e.g. matrix, shuffle, pyramid, star, snowflake
- 15/17306 . . . {Intercommunication techniques}
- 15/17312 . . . {Routing techniques specific to parallel machines, e.g. wormhole, store and forward, shortest path problem congestion (routing on a LAN [H04L 45/00](#))}
- 15/17318 . . . {Parallel communications techniques, e.g. gather, scatter, reduce, roadcast, multicast, all to all}
- 15/17325 . . . {Synchronisation; Hardware support therefor (intertask synchronisation [G06F 9/52](#))}
- 15/17331 . . . {Distributed shared memory [DSM], e.g. remote direct memory access [RDMA]}
- 15/17337 . . . {Direct connection machines, e.g. completely connected computers, point to point communication networks (coupling between buses [G06F 13/4004](#))}
- 15/17343 . . . {wherein the interconnection is dynamically configurable, e.g. having loosely coupled nearest neighbor architecture (reconfigurable processors arrays [G06F 15/7867](#))}
- 15/1735 . . . {Network adapters, e.g. SCI, Myrinet (protocol engines [H04L 29/06081](#))}
- 15/17356 . . . {Indirect interconnection networks}
- 15/17362 . . . {hierarchical topologies}
- 15/17368 . . . {non hierarchical topologies}
- 15/17375 . . . {One dimensional, e.g. linear array, ring}
- 15/17381 . . . {Two dimensional, e.g. mesh, torus}
- 15/17387 . . . {Three dimensional, e.g. hypercubes}
- 15/17393 . . . {having multistage networks, e.g. broadcasting scattering, gathering, hot spot contention, combining/decombining}
- 15/177 . . Initialisation or configuration control {(processor initialisation [G06F 9/4405](#))}
- 15/76 . Architectures of general purpose stored program computers (with program plugboard [G06F 15/08](#); multicomputers [G06F 15/16](#))
- 2015/761 . . {Indexing scheme relating to architectures of general purpose stored programme computers}
- 2015/763 . . . {ASIC}
- 2015/765 . . . {Cache}
- 2015/766 . . . {Flash EPROM}
- 2015/768 . . . {Gate array}
- 15/78 . . comprising a single central processing unit
- 15/7803 . . . {System on board, i.e. computer system on one or more PCB, e.g. motherboards, daughterboards or blades}
- 15/7807 . . . {System on chip, i.e. computer system on a single chip; System in package, i.e. computer system on one or more chips in a single package}
- 15/781 . . . {On-chip cache; Off-chip memory}
- 15/7814 . . . {Specially adapted for real time processing, e.g. comprising hardware timers}
- 15/7817 . . . {Specially adapted for signal processing, e.g. Harvard architectures}
- 15/7821 . . . {Tightly coupled to memory, e.g. computational memory, smart memory, processor in memory}
- 15/7825 . . . {Globally asynchronous, locally synchronous, e.g. network on chip}
- 15/7828 . . . {without memory}
- 15/7832 . . . {on one IC chip (single chip microprocessors)}
- 15/7835 . . . {on more than one IC chip}
- 15/7839 . . . {with memory}
- 15/7842 . . . {on one IC chip (single chip microcontrollers)}
- 15/7846 . . . {On-chip cache and off-chip main memory}
- 15/785 . . . {with decentralized control, e.g. smart memories}
- 15/7853 . . . {including a ROM}

- 15/7857 {using interleaved memory ([addressing G06F 12/0607](#))}
- 15/786 {using a single memory module}
- 15/7864 {on more than one IC chip}
- 15/7867 . . . {with reconfigurable architecture}
- 15/7871 {Reconfiguration support, e.g. configuration loading, configuration switching, or hardware OS}
- 15/7875 {for multiple contexts}
- 15/7878 {for pipeline reconfiguration}
- 15/7882 {for self reconfiguration}
- 15/7885 {Runtime interface, e.g. data exchange, runtime control}
- 15/7889 {Reconfigurable logic implemented as a co-processor ([instruction execution using a coprocessor G06F 9/3877](#))}
- 15/7892 {Reconfigurable logic embedded in CPU, e.g. reconfigurable unit}
- 15/7896 . . . {Modular architectures, e.g. assembled from a number of identical packages}
- 15/80 . . . comprising an array of processing units with common control, e.g. single instruction multiple data processors ([G06F 15/82 takes precedence](#) ; for correlation function computation [G06F 17/15](#))}
- 15/8007 . . . {single instruction multiple data [SIMD] multiprocessors}
- 15/8015 {One dimensional arrays, e.g. rings, linear arrays, buses}
- 15/8023 {Two dimensional arrays, e.g. mesh, torus}
- 15/803 {Three-dimensional arrays or hypercubes}
- 15/8038 . . . {Associative processors}
- 15/8046 . . . {Systolic arrays}
- 15/8053 . . . {Vector processors}
- 15/8061 {Details on data memory access}
- 15/8069 {using a cache}
- 15/8076 {Details on data register access}
- 15/8084 {Special arrangements thereof, e.g. mask or switch}
- 15/8092 {Array of vector units}
- 15/82 . . . data or demand driven
- 15/825 . . . {Dataflow computers}
- 16/00 Information retrieval; Database structures therefor; File system structures therefor**
- 16/10 . . . File systems; File servers
- 16/11 . . . File system administration, e.g. details of archiving or snapshots ([file system backup G06F 11/14](#))
- 16/113 . . . {Details of archiving ([lifecycle management in storage systems G06F 3/0649](#); [backup systems G06F 11/1446](#))}
- 16/116 . . . {Details of conversion of file system types or formats}
- 16/119 . . . {Details of migration of file systems ([migration mechanisms in storage systems G06F 3/0647](#))}
- 16/122 . . . {using management policies ([backup systems G06F 11/1446](#); [file migration policies for HSM systems G06F 16/185](#))}
- 16/125 {characterised by the use of retention policies ([retention policies for HSM systems G06F 16/185](#))}
- 16/128 . . . {Details of file system snapshots on the file-level, e.g. snapshot creation, administration, deletion ([use of snapshots for error detection or correction G06F 11/14](#), [G06F 11/16](#))}
- 16/13 . . . File access structures, e.g. distributed indices ([arrangements of input from, or output to, record carriers G06F 3/06](#))
- 16/134 . . . {Distributed indices}
- 16/137 . . . {Hash-based ([content-based indexing of textual data G06F 16/31](#))}
- 16/14 . . . Details of searching files based on file metadata
- 16/144 . . . {Query formulation}
- 16/148 . . . {File search processing}
- 16/152 {using file content signatures, e.g. hash values}
- 16/156 . . . {Query results presentation}
- 16/16 . . . File or folder operations, e.g. details of user interfaces specifically adapted to file systems
- 16/162 . . . {Delete operations ([erasing in storage systems G06F 3/0652](#))}
- 16/164 . . . {File meta data generation}
- 16/166 {File name conversion}
- 16/168 . . . {Details of user interfaces specifically adapted to file systems, e.g. browsing and visualisation, 2d or 3d GUIs ([query results presentation G06F 16/156](#))}
- 16/17 . . . Details of further file system functions
- 16/172 . . . Caching, prefetching or hoarding of files
- 16/1724 . . . {Details of de-fragmentation performed by the file system ([saving storage space on storage systems G06F 3/0608](#); [management of blocks in storage devices G06F 3/064](#))}
- 16/1727 . . . {Details of free space management performed by the file system ([saving storage space on storage systems G06F 3/0608](#); [management of blocks in storage devices G06F 3/064](#))}
- 16/173 . . . {Customisation support for file systems, e.g. localisation, multi-language support, personalisation}
- 16/1734 . . . {Details of monitoring file system events, e.g. by the use of hooks, filter drivers, logs}
- 16/1737 . . . {for reducing power consumption or coping with limited storage space, e.g. in mobile devices ([saving storage space on storage devices G06F 3/0608](#); [power saving in storage systems G06F 3/0625](#))}
- 16/174 . . . Redundancy elimination performed by the file system ([management of the data involved in backup or backup restore using de-duplication of the data G06F 11/14](#))
- 16/1744 {using compression, e.g. sparse files}
- 16/1748 {De-duplication implemented within the file system, e.g. based on file segments ([de-duplication techniques in storage systems for the management of data blocks G06F 3/0641](#))}
- 16/1752 {based on file chunks}
- 16/1756 {based on delta files}
- 16/176 . . . Support for shared access to files; File sharing support
- 16/1767 {Concurrency control, e.g. optimistic or pessimistic approaches}

- 16/1774 {Locking methods, e.g. locking methods for file systems allowing shared and concurrent access to files}
- 16/178 . . . Techniques for file synchronisation in file systems
- 16/1787 {Details of non-transparently synchronising file systems}
- 16/1794 {Details of file format conversion}
- WARNING**
- Group [G06F 16/1794](#) is impacted by reclassification into group [G06F 16/258](#). Groups [G06F 16/1794](#) and [G06F 16/258](#) should be considered in order to perform a complete search.
- 16/18 . . File system types
- 16/1805 . . . {Append-only file systems, e.g. using logs or journals to store data}
- 16/181 {providing write once read many [WORM] semantics}
- 16/1815 {Journaling file systems}
- 16/182 . . . Distributed file systems
- 16/1824 {implemented using Network-attached Storage [NAS] architecture (distributed or networked storage systems [G06F 3/067](#); protocols for distributed storage of data in a network [H04L 67/1097](#))}
- 16/1827 {Management specifically adapted to NAS (management of storage area networks [SAN] [G06F 3/067](#))}
- 16/183 {Provision of network file services by network file servers, e.g. by using NFS, CIFS (network file access protocols [H04L 67/1097](#))}
- 16/1834 {implemented based on peer-to-peer networks, e.g. gnutella (p2p communication protocols [H04L 67/104](#))}
- 16/1837 {Management specially adapted to peer-to-peer storage networks (topology management mechanisms of peer-to-peer networks [H04L 67/1042](#))}
- 16/184 {implemented as replicated file system}
- 16/1844 {Management specifically adapted to replicated file systems}
- 16/1847 . . . {specifically adapted to static storage, e.g. adapted to flash memory or SSD}
- 16/185 . . . Hierarchical storage management [HSM] systems, e.g. file migration or policies thereof (details of archiving [G06F 16/11](#))
- 16/1858 . . . {Parallel file systems, i.e. file systems supporting multiple processors}
- 16/1865 . . . {Transactional file systems}
- 16/1873 . . . {Versioning file systems, temporal file systems, e.g. file system supporting different historic versions of files}
- 16/188 . . . Virtual file systems
- 16/192 {Implementing virtual folder structures}
- 16/196 {Specific adaptations of the file system to access devices and non-file objects via standard file system access operations, e.g. pseudo file systems (dedicated interfaces to storage systems [G06F 3/0601](#))}
- 16/20 . . of structured data, e.g. relational data
- 16/21 . . Design, administration or maintenance of databases
- 16/211 . . . {Schema design and management}
- 16/212 {with details for data modelling support}
- 16/213 {with details for schema evolution support}
- 16/214 . . . {Database migration support}
- 16/215 . . . Improving data quality; Data cleansing, e.g. de-duplication, removing invalid entries or correcting typographical errors
- 16/217 . . . {Database tuning ([G06F 16/2282](#) takes precedence; database performance monitoring [G06F 11/3409](#))}
- 16/219 . . . {Managing data history or versioning (querying versioned data [G06F 16/2474](#); querying temporal data [G06F 16/2477](#))}
- 16/22 . . Indexing; Data structures therefor; Storage structures
- 16/221 . . . {Column-oriented storage; Management thereof}
- 16/2219 . . . {Large Object storage; Management thereof}
- 16/2228 . . . {Indexing structures}
- 16/2237 {Vectors, bitmaps or matrices}
- 16/2246 {Trees, e.g. B+trees}
- 16/2255 {Hash tables}
- 16/2264 {Multidimensional index structures}
- 16/2272 {Management thereof}
- 16/2282 . . . {Tablespace storage structures; Management thereof}
- 16/2291 . . . {User-Defined Types; Storage management thereof}
- 16/23 . . Updating
- WARNING**
- Group [G06F 16/23](#) is impacted by reclassification into group [G06F 16/25](#). Groups [G06F 16/23](#) and [G06F 16/25](#) should be considered in order to perform a complete search.
- 16/2308 . . . {Concurrency control (transaction processing [G06F 9/466](#))}
- WARNING**
- Group [G06F 16/2308](#) is impacted by reclassification into groups [G06F 16/2315](#), [G06F 16/2322](#), [G06F 16/2329](#), [G06F 16/2336](#), and [G06F 16/2343](#). All groups listed in this Warning should be considered in order to perform a complete search.
- 16/2315 {Optimistic concurrency control}
- WARNING**
- Groups [G06F 16/2315](#) - [G06F 16/2329](#) are incomplete pending reclassification of documents from group [G06F 16/2308](#). Groups [G06F 16/2308](#) and [G06F 16/2315](#) - [G06F 16/2329](#) should be considered in order to perform a complete search.
- 16/2322 {using timestamps}
- 16/2329 {using versioning}

- 16/2336 {Pessimistic concurrency control approaches, e.g. locking or multiple versions without time stamps}
- WARNING**
- Groups [G06F 16/2336](#) and [G06F 16/2343](#) are incomplete pending reclassification of documents from group [G06F 16/2308](#).
- Groups [G06F 16/2308](#), [G06F 16/2336](#), and [G06F 16/2343](#) should be considered in order to perform a complete search.
- 16/2343 {Locking methods, e.g. distributed locking or locking implementation details}
- 16/235 . . . {Update request formulation}
- 16/2358 . . . {Change logging, detection, and notification ([replication G06F 16/27](#))}
- 16/2365 . . . {Ensuring data consistency and integrity}
- 16/2372 . . . {Updates performed during offline database operations}
- 16/2379 . . . {Updates performed during online database operations; commit processing}
- 16/2386 {Bulk updating operations ([data conversion details G06F 16/258](#))}
- 16/2393 . . . {Updating materialised views}
- 16/24 . . Querying
- 16/242 . . . Query formulation
- 16/2423 {Interactive query statement specification based on a database schema}
- 16/2425 {Iterative querying; Query formulation based on the results of a preceding query}
- 16/2428 {Query predicate definition using graphical user interfaces, including menus and forms ([G06F 16/2423 takes precedence](#))}
- 16/243 {Natural language query formulation}
- 16/2433 {Query languages}
- 16/2435 {Active constructs}
- 16/2438 {Embedded query languages}
- 16/244 {Grouping and aggregation}
- 16/2443 {Stored procedures}
- 16/2445 {Data retrieval commands; View definitions}
- 16/2448 {for particular applications; for extensibility, e.g. user defined types}
- 16/245 . . . Query processing
- 16/2452 Query translation
- 16/24522 {Translation of natural language queries to structured queries}
- 16/24524 {Access plan code generation and invalidation; Reuse of access plans}
- 16/24526 {Internal representations for queries}
- 16/24528 {Standardisation; Simplification}
- 16/2453 Query optimisation
- 16/24532 {of parallel queries}
- 16/24534 {Query rewriting; Transformation}
- 16/24535 {of sub-queries or views}
- 16/24537 {of operators}
- 16/24539 {using cached or materialised query results}
- 16/2454 {Optimisation of common expressions}
- 16/24542 {Plan optimisation}
- 16/24544 {Join order optimisation}
- 16/24545 {Selectivity estimation or determination}
- 16/24547 {Optimisations to support specific applications; Extensibility of optimisers}
- 16/24549 {Run-time optimisation}
- 16/2455 Query execution
- 16/24552 {Database cache management}
- 16/24553 {of query operations}
- 16/24554 {Unary operations; Data partitioning operations}
- 16/24556 {Aggregation; Duplicate elimination}
- 16/24557 {Efficient disk access during query execution}
- 16/24558 {Binary matching operations}
- 16/2456 {Join operations}
- 16/24561 {Intermediate data storage techniques for performance improvement}
- 16/24562 {Pointer or reference processing operations}
- 16/24564 {Applying rules; Deductive queries}
- 16/24565 {Triggers; Constraints}
- 16/24566 {Recursive queries}
- 16/24568 {Data stream processing; Continuous queries}
- 16/24569 {Query processing with adaptation to specific hardware, e.g. adapted for using GPUs or SSDs}
- 16/2457 with adaptation to user needs
- 16/24573 {using data annotations, e.g. user-defined metadata}
- 16/24575 {using context}
- 16/24578 {using ranking}
- 16/2458 Special types of queries, e.g. statistical queries, fuzzy queries or distributed queries
- 16/2462 {Approximate or statistical queries}
- 16/2465 {Query processing support for facilitating data mining operations in structured databases}
- 16/2468 {Fuzzy queries}
- 16/2471 {Distributed queries}
- 16/2474 {Sequence data queries, e.g. querying versioned data}
- 16/2477 {Temporal data queries}
- 16/248 . . . Presentation of query results
- 16/25 . . Integrating or interfacing systems involving database management systems
- WARNING**
- Group [G06F 16/25](#) is incomplete pending reclassification of documents from group [G06F 16/23](#).
- Groups [G06F 16/23](#) and [G06F 16/25](#) should be considered in order to perform a complete search.
- 16/252 . . . {between a Database Management System and a front-end application}
- 16/254 . . . {Extract, transform and load [ETL] procedures, e.g. ETL data flows in data warehouses}
- 16/256 . . . {in federated or virtual databases}

- 16/258 . . . {Data format conversion from or to a database}
WARNING
 Groups [G06F 16/258](#) is incomplete pending reclassification of documents from group [G06F 16/1794](#).
 Groups [G06F 16/1794](#) and [G06F 16/258](#) should be considered in order to perform a complete search.
- 16/26 . . Visual data mining; Browsing structured data
- 16/27 . . Replication, distribution or synchronisation of data between databases or within a distributed database system; Distributed database system architectures therefor
WARNING
 Group [G06F 16/27](#) is impacted by reclassification into groups [G06F 16/273](#), [G06F 16/275](#), and [G06F 16/278](#).
 All groups listed in this Warning should be considered in order to perform a complete search.
- 16/273 . . . {Asynchronous replication or reconciliation}
WARNING
 Groups [G06F 16/273](#) is incomplete pending reclassification of documents from group [G06F 16/27](#).
 Groups [G06F 16/27](#) and [G06F 16/273](#) should be considered in order to perform a complete search.
- 16/275 . . . {Synchronous replication}
WARNING
 Groups [G06F 16/275](#) is incomplete pending reclassification of documents from group [G06F 16/27](#).
 Groups [G06F 16/27](#) and [G06F 16/275](#) should be considered in order to perform a complete search.
- 16/278 . . . {Data partitioning, e.g. horizontal or vertical partitioning}
WARNING
 Groups [G06F 16/278](#) is incomplete pending reclassification of documents from group [G06F 16/27](#).
 Groups [G06F 16/27](#) and [G06F 16/278](#) should be considered in order to perform a complete search.
- 16/28 . . Databases characterised by their database models, e.g. relational or object models
- 16/282 . . . {Hierarchical databases, e.g. IMS, LDAP data stores or Lotus Notes}
- 16/283 . . . {Multi-dimensional databases or data warehouses, e.g. MOLAP or ROLAP}
- 16/284 . . . {Relational databases}
- 16/285 {Clustering or classification}
- 16/287 {Visualization; Browsing}
- 16/288 {Entity relationship models}
- 16/289 . . . {Object oriented databases}
- 16/29 . . Geographical information databases
- 16/30 . . of unstructured textual data ([document management systems G06F 16/93](#))
NOTE
 In groups [G06F 16/30](#), [G06F 16/31](#), [G06F 16/313](#), [G06F 16/316](#), [G06F 16/319](#), [G06F 16/322](#), [G06F 16/325](#), [G06F 16/328](#), [G06F 16/33](#), [G06F 16/332](#), [G06F 16/3322](#), [G06F 16/3323](#), [G06F 16/3325](#), [G06F 16/3326](#), [G06F 16/3328](#), [G06F 16/3329](#), [G06F 16/3331](#), [G06F 16/3332](#), [G06F 16/3334](#), [G06F 16/3335](#), [G06F 16/3337](#), [G06F 16/3338](#), [G06F 16/334](#), [G06F 16/3341](#), [G06F 16/3343](#), [G06F 16/3344](#), [G06F 16/3346](#), [G06F 16/3347](#), [G06F 16/3349](#), [G06F 16/335](#), [G06F 16/337](#), [G06F 16/338](#), [G06F 16/34](#), [G06F 16/345](#), [G06F 16/35](#), [G06F 16/353](#), [G06F 16/355](#), [G06F 16/358](#), [G06F 16/36](#), [G06F 16/367](#) and [G06F 16/374](#), subject matter relevant to retrieval characterised by using metadata, when it is determined to be novel and non-obvious, must also be classified in groups [G06F 16/38](#), [G06F 16/381](#), [G06F 16/382](#), [G06F 16/383](#), and [G06F 16/387](#).
- 16/31 . . Indexing; Data structures therefor; Storage structures
- 16/313 . . . {Selection or weighting of terms for indexing}
- 16/316 . . . {Indexing structures}
- 16/319 {Inverted lists}
- 16/322 {Trees}
- 16/325 {Hash tables}
- 16/328 {Management therefor}
- 16/33 . . Querying
- 16/332 . . . Query formulation
- 16/3322 {using system suggestions ([G06F 16/3325 takes precedence](#))}
- 16/3323 {using document space presentation or visualization, e.g. category, hierarchy or range presentation and selection}
- 16/3325 {Reformulation based on results of preceding query}
- 16/3326 {using relevance feedback from the user, e.g. relevance feedback on documents, documents sets, document terms or passages}
- 16/3328 {using graphical result space presentation or visualisation}
- 16/3329 {Natural language query formulation or dialogue systems}
- 16/3331 . . . {Query processing}
- 16/3332 {Query translation}
- 16/3334 {Selection or weighting of terms from queries, including natural language queries}
- 16/3335 {Syntactic pre-processing, e.g. stopword elimination, stemming}
- 16/3337 {Translation of the query language, e.g. Chinese to English}
- 16/3338 {Query expansion}
- 16/334 {Query execution ([G06F 16/335 takes precedence](#))}
- 16/3341 {using boolean model}
- 16/3343 {using phonetics}
- 16/3344 {using natural language analysis}

- 16/3346 {using probabilistic model}
- 16/3347 {using vector based model}
- 16/3349 {Reuse of stored results of previous queries}
- 16/335 . . . Filtering based on additional data, e.g. user or group profiles ([filtering in web context G06F 16/9535](#), [G06F 16/9536](#))
- 16/337 {Profile generation, learning or modification}
- 16/338 . . . Presentation of query results
- 16/34 . . Browsing; Visualisation thereof
- 16/345 . . . {Summarisation for human users}
- 16/35 . . Clustering; Classification
- 16/353 . . . {into predefined classes}
- 16/355 . . . {Class or cluster creation or modification}
- 16/358 . . . {Browsing; Visualisation thereof}
- 16/36 . . Creation of semantic tools, e.g. ontology or thesauri
- 16/367 . . . {Ontology}
- 16/374 . . . {Thesaurus}
- 16/38 . . Retrieval characterised by using metadata, e.g. metadata not derived from the content or metadata generated manually

WARNING

Group [G06F 16/38](#) is impacted by reclassification into groups [G06F 16/383](#) and [G06F 16/387](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 16/381 . . . {using identifiers, e.g. barcodes, RFIDs (for [URLs G06F 16/9554](#))}
- 16/382 . . . {using citations ([hypermedia G06F 16/94](#))}
- 16/383 . . . using metadata automatically derived from the content

WARNING

Group [G06F 16/383](#) is incomplete pending reclassification of documents from group [G06F 16/38](#).

Groups [G06F 16/38](#) and [G06F 16/383](#) should be considered in order to perform a complete search.

- 16/387 . . . using geographical or spatial information, e.g. location

WARNING

Group [G06F 16/387](#) is incomplete pending reclassification of documents from group [G06F 16/38](#).

Groups [G06F 16/38](#) and [G06F 16/387](#) should be considered in order to perform a complete search.

- 16/40 . . of multimedia data, e.g. slideshows comprising image and additional audio data ([retrieval of still image data G06F 16/50](#); [retrieval of audio data G06F 16/60](#); [retrieval of video data G06F 16/70](#))

NOTE

In groups [G06F 16/40](#), [G06F 16/41](#), [G06F 16/43](#), [G06F 16/432](#), [G06F 16/433](#), [G06F 16/434](#), [G06F 16/435](#), [G06F 16/436](#), [G06F 16/437](#), [G06F 16/438](#), [G06F 16/4387](#),

[G06F 16/4393](#), [G06F 16/44](#), [G06F 16/444](#), [G06F 16/447](#) and [G06F 16/45](#), subject matter relevant to retrieval characterised by using metadata, when it is determined to be novel and non-obvious, must also be classified in groups [G06F 16/48](#), [G06F 16/483](#), [G06F 16/487](#) and [G06F 16/489](#).

WARNING

Group [G06F 16/40](#) is impacted by reclassification into groups [G06F 16/45](#), [G06F 16/48](#), [G06F 16/483](#), [G06F 16/487](#), and [G06F 16/489](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 16/41 . . Indexing; Data structures thereof; Storage structures
- 16/43 . . Querying

WARNING

Group [G06F 16/43](#) is impacted by reclassification into groups [G06F 16/432](#), [G06F 16/48](#), [G06F 16/483](#), [G06F 16/487](#), and [G06F 16/489](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 16/432 . . . Query formulation

WARNING

Group [G06F 16/432](#) is incomplete pending reclassification of documents from group [G06F 16/43](#).

Groups [G06F 16/43](#) and [G06F 16/432](#) should be considered in order to perform a complete search.

- 16/433 {using audio data}
- 16/434 {using image data, e.g. images, photos, pictures taken by a user}
- 16/435 . . . Filtering based on additional data, e.g. user or group profiles
- 16/436 {using biological or physiological data of a human being, e.g. blood pressure, facial expression, gestures}
- 16/437 {Administration of user profiles, e.g. generation, initialisation, adaptation, distribution}
- 16/438 . . . Presentation of query results
- 16/4387 {by the use of playlists}
- 16/4393 {Multimedia presentations, e.g. slide shows, multimedia albums}
- 16/44 . . Browsing; Visualisation thereof
- 16/444 . . . {Spatial browsing, e.g. 2D maps, 3D or virtual spaces}
- 16/447 . . . {Temporal browsing, e.g. timeline}

- 16/45 . . Clustering; Classification

WARNING

Group [G06F 16/45](#) is incomplete pending reclassification of documents from group [G06F 16/40](#).

Groups [G06F 16/40](#) and [G06F 16/45](#) should be considered in order to perform a complete search.

- 16/48 . . Retrieval characterised by using metadata, e.g. metadata not derived from the content or metadata generated manually

WARNING

Group [G06F 16/48](#) is incomplete pending reclassification of documents from groups [G06F 16/40](#) and [G06F 16/43](#).

Groups [G06F 16/40](#), [G06F 16/43](#), and [G06F 16/48](#) should be considered in order to perform a complete search.

- 16/483 . . . using metadata automatically derived from the content

WARNING

Group [G06F 16/483](#) is incomplete pending reclassification of documents from groups [G06F 16/40](#) and [G06F 16/43](#).

Groups [G06F 16/40](#), [G06F 16/43](#), and [G06F 16/483](#) should be considered in order to perform a complete search.

- 16/487 . . . using geographical or spatial information, e.g. location

WARNING

Group [G06F 16/487](#) is incomplete pending reclassification of documents from groups [G06F 16/40](#) and [G06F 16/43](#).

Groups [G06F 16/40](#), [G06F 16/43](#), and [G06F 16/487](#) should be considered in order to perform a complete search.

- 16/489 . . . {using time information}

WARNING

Group [G06F 16/489](#) is incomplete pending reclassification of documents from groups [G06F 16/40](#) and [G06F 16/43](#).

Groups [G06F 16/40](#), [G06F 16/43](#), and [G06F 16/489](#) should be considered in order to perform a complete search.

- 16/50 . of still image data

NOTE

In groups [G06F 16/50](#), [G06F 16/51](#), [G06F 16/53](#), [G06F 16/532](#), [G06F 16/535](#), [G06F 16/538](#), [G06F 16/54](#), [G06F 16/55](#) and [G06F 16/56](#), subject matter relevant to retrieval characterised by using metadata, when it is determined to be novel and non-obvious, must also be classified in groups [G06F 16/58](#), [G06F 16/583](#), [G06F 16/5838](#), [G06F 16/5846](#), [G06F 16/5854](#), [G06F 16/5862](#) and [G06F 16/587](#).

WARNING

Group [G06F 16/50](#) is impacted by reclassification into groups [G06F 16/53](#), [G06F 16/532](#), [G06F 16/535](#), [G06F 16/538](#), and [G06F 16/55](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 16/51 . . Indexing; Data structures therefor; Storage structures

- 16/53 . . Querying

WARNING

Group [G06F 16/53](#) is incomplete pending reclassification of documents from group [G06F 16/50](#).

Groups [G06F 16/50](#) and [G06F 16/53](#) should be considered in order to perform a complete search.

- 16/532 . . . Query formulation, e.g. graphical querying

WARNING

Group [G06F 16/532](#) is incomplete pending reclassification of documents from group [G06F 16/50](#).

Groups [G06F 16/50](#) and [G06F 16/532](#) should be considered in order to perform a complete search.

- 16/535 . . . Filtering based on additional data, e.g. user or group profiles

WARNING

Group [G06F 16/535](#) is incomplete pending reclassification of documents from group [G06F 16/50](#).

Groups [G06F 16/50](#) and [G06F 16/535](#) should be considered in order to perform a complete search.

- 16/538 . . . Presentation of query results

WARNING

Group [G06F 16/538](#) is incomplete pending reclassification of documents from group [G06F 16/50](#).

Groups [G06F 16/50](#) and [G06F 16/538](#) should be considered in order to perform a complete search.

- 16/54 . . Browsing; Visualisation therefor

- 16/55 . . Clustering; Classification

WARNING

Group [G06F 16/55](#) is incomplete pending reclassification of documents from group [G06F 16/50](#).

Groups [G06F 16/50](#) and [G06F 16/55](#) should be considered in order to perform a complete search.

- 16/56 . . having vectorial format

- 16/58 . . Retrieval characterised by using metadata, e.g. metadata not derived from the content or metadata generated manually
- WARNING**
- Group [G06F 16/58](#) is impacted by reclassification into group [G06F 16/587](#).
- Groups [G06F 16/58](#) and [G06F 16/587](#) should be considered in order to perform a complete search.
- 16/583 . . . using metadata automatically derived from the content
- 16/5838 {using colour}
- WARNING**
- Group [G06F 16/5838](#) is impacted by reclassification into groups [G06F 16/5846](#), [G06F 16/5854](#), and [G06F 16/5862](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 16/5846 {using extracted text}
- WARNING**
- Group [G06F 16/5846](#) is incomplete pending reclassification of documents from group [G06F 16/5838](#).
- Groups [G06F 16/5838](#) and [G06F 16/5846](#) should be considered in order to perform a complete search.
- 16/5854 {using shape and object relationship}
- WARNING**
- Group [G06F 16/5854](#) is incomplete pending reclassification of documents from group [G06F 16/5838](#).
- Groups [G06F 16/5838](#) and [G06F 16/5854](#) should be considered in order to perform a complete search.
- 16/5862 {using texture}
- WARNING**
- Group [G06F 16/5862](#) is incomplete pending reclassification of documents from group [G06F 16/5838](#).
- Groups [G06F 16/5838](#) and [G06F 16/5862](#) should be considered in order to perform a complete search.
- 16/5866 {using information manually generated, e.g. tags, keywords, comments, manually generated location and time information}
- WARNING**
- Group [G06F 16/5866](#) is impacted by reclassification into group [G06F 16/587](#).
- Groups [G06F 16/5866](#) and [G06F 16/587](#) should be considered in order to perform a complete search.
- 16/587 . . . using geographical or spatial information, e.g. location
- WARNING**
- Group [G06F 16/587](#) is incomplete pending reclassification of documents from groups [G06F 16/58](#) and [G06F 16/5866](#).
- Groups [G06F 16/58](#), [G06F 16/5866](#), and [G06F 16/587](#) should be considered in order to perform a complete search.
- 16/60 . of audio data
- NOTE**
- In groups [G06F 16/60](#), [G06F 16/61](#), [G06F 16/63](#), [G06F 16/632](#), [G06F 16/634](#), [G06F 16/635](#), [G06F 16/636](#), [G06F 16/637](#), [G06F 16/638](#), [G06F 16/639](#), [G06F 16/64](#), and [G06F 16/65](#), subject matter relevant to retrieval characterised by using metadata, when it is determined to be novel and non-obvious, must also be classified in groups [G06F 16/68](#), [G06F 16/683](#), [G06F 16/685](#), [G06F 16/686](#) and [G06F 16/687](#).
- WARNING**
- Group [G06F 16/60](#) is impacted by reclassification into groups [G06F 16/63](#) and [G06F 16/65](#).
- Groups [G06F 16/60](#), [G06F 16/63](#), and [G06F 16/65](#) should be considered in order to perform a complete search.
- 16/61 . . Indexing; Data structures therefor; Storage structures
- 16/63 . . Querying
- WARNING**
- Group [G06F 16/63](#) is incomplete pending reclassification of documents from group [G06F 16/60](#).
- Groups [G06F 16/60](#) and [G06F 16/63](#) should be considered in order to perform a complete search.
- 16/632 . . . Query formulation
- 16/634 {Query by example, e.g. query by humming}
- 16/635 . . . Filtering based on additional data, e.g. user or group profiles
- 16/636 {by using biological or physiological data}
- 16/637 {Administration of user profiles, e.g. generation, initialization, adaptation or distribution}
- 16/638 . . . Presentation of query results
- 16/639 {using playlists}
- 16/64 . . Browsing; Visualisation therefor ([generation of a list or set of audio data G06F 16/638](#))

- 16/65 . . Clustering; Classification

WARNING

Group [G06F 16/65](#) is incomplete pending reclassification of documents from group [G06F 16/60](#).

Groups [G06F 16/60](#) and [G06F 16/65](#) should be considered in order to perform a complete search.

- 16/68 . . Retrieval characterised by using metadata, e.g. metadata not derived from the content or metadata generated manually

WARNING

Group [G06F 16/68](#) is impacted by reclassification into group [G06F 16/687](#).

Groups [G06F 16/68](#) and [G06F 16/687](#) should be considered in order to perform a complete search.

- 16/683 . . . using metadata automatically derived from the content

- 16/685 {using automatically derived transcript of audio data, e.g. lyrics ([speech recognition G10L 15/00](#))}

- 16/686 . . . {using information manually generated, e.g. tags, keywords, comments, title or artist information, time, location or usage information, user ratings}

WARNING

Group [G06F 16/686](#) is impacted by reclassification into group [G06F 16/687](#).

Groups [G06F 16/686](#) and [G06F 16/687](#) should be considered in order to perform a complete search.

- 16/687 . . . using geographical or spatial information, e.g. location

WARNING

Group [G06F 16/687](#) is incomplete pending reclassification of documents from groups [G06F 16/68](#) and [G06F 16/686](#).

Groups [G06F 16/68](#), [G06F 16/686](#), and [G06F 16/687](#) should be considered in order to perform a complete search.

- 16/70 . of video data

NOTE

In groups [G06F 16/70](#), [G06F 16/71](#), [G06F 16/73](#), [G06F 16/732](#), [G06F 16/7328](#), [G06F 16/7335](#), [G06F 16/7343](#), [G06F 16/735](#), [G06F 16/738](#), [G06F 16/739](#), [G06F 16/74](#), [G06F 16/743](#), [G06F 16/745](#), [G06F 16/78](#) and [G06F 16/75](#), subject matter relevant to retrieval characterised by using metadata, when it is determined to be novel and non-obvious, must also be classified in groups [G06F 16/78](#), [G06F 16/783](#), [G06F 16/7834](#), [G06F 16/7837](#), [G06F 16/784](#), [G06F 16/7844](#), [G06F 16/7847](#), [G06F 16/785](#), [G06F 16/7854](#), [G06F 16/7857](#), [G06F 16/786](#), [G06F 16/7864](#), [G06F 16/7867](#) and [G06F 16/787](#).

WARNING

Group [G06F 16/70](#) is impacted by reclassification into group [G06F 16/75](#).

Groups [G06F 16/70](#) and [G06F 16/75](#) should be considered in order to perform a complete search.

- 16/71 . . Indexing; Data structures therefor; Storage structures

- 16/73 . . Querying

WARNING

Group [G06F 16/73](#) is impacted by reclassification into group [G06F 16/732](#).

Groups [G06F 16/73](#) and [G06F 16/732](#) should be considered in order to perform a complete search.

- 16/732 . . . Query formulation

WARNING

Group [G06F 16/732](#) is incomplete pending reclassification of documents from group [G06F 16/73](#).

Groups [G06F 16/73](#) and [G06F 16/732](#) should be considered in order to perform a complete search.

- 16/7328 {Query by example, e.g. a complete video frame or video sequence ([graphical querying G06F 16/7335](#))}

- 16/7335 {Graphical querying, e.g. query-by-region, query-by-sketch, query-by-trajectory, GUIs for designating a person/face/object as a query predicate ([end-user interface involving hot spots associated with the video H04N 21/4725](#); [end-user interface for selecting a Region of Interest H04N 21/4728](#))}

- 16/7343 {Query language or query format}

- 16/735 . . . Filtering based on additional data, e.g. user or group profiles

- 16/738 . . . Presentation of query results

- 16/739 {in form of a video summary, e.g. the video summary being a video sequence, a composite still image or having synthesized frames}

- 16/74 . . Browsing; Visualisation therefor ([end-user interfaces for requesting or interacting with video content, e.g. video on demand interfaces or electronic program guides, H04N 21/472](#))

- 16/743 . . . {a collection of video files or sequences}

- 16/745 . . . {the internal structure of a single video sequence}

- 16/748 . . . {Hypervideo ([linking data to content, e.g. by linking an URL to a video object in the context of video distribution systems H04N 21/858](#))}

- 16/75 . . Clustering; Classification

WARNING

Group [G06F 16/75](#) is incomplete pending reclassification of documents from group [G06F 16/70](#).

Groups [G06F 16/70](#) and [G06F 16/75](#) should be considered in order to perform a complete search.

- 16/78 . . Retrieval characterised by using metadata, e.g. metadata not derived from the content or metadata generated manually

WARNING

Group [G06F 16/78](#) is impacted by reclassification into group [G06F 16/787](#).

Groups [G06F 16/78](#) and [G06F 16/787](#) should be considered in order to perform a complete search.

- 16/783 . . . using metadata automatically derived from the content
- 16/7834 {using audio features}
- 16/7837 {using objects detected or recognised in the video content}
- 16/784 {the detected or recognised objects being people}
- 16/7844 {using original textual content or text extracted from visual content or transcript of audio data}
- 16/7847 {using low-level visual features of the video content}
- 16/785 {using colour or luminescence}
- 16/7854 {using shape ([G06F 16/7837](#) takes precedence)}
- 16/7857 {using texture ([G06F 16/7837](#) takes precedence)}
- 16/786 {using motion, e.g. object motion or camera motion}
- 16/7864 {using domain-transform features, e.g. DCT or wavelet transform coefficients}
- 16/7867 . . . {using information manually generated, e.g. tags, keywords, comments, title and artist information, manually generated time, location and usage information, user ratings}

WARNING

Group [G06F 16/7867](#) is impacted by reclassification into group [G06F 16/787](#).

Groups [G06F 16/7867](#) and [G06F 16/787](#) should be considered in order to perform a complete search.

- 16/787 . . . using geographical or spatial information, e.g. location

WARNING

Group [G06F 16/787](#) is incomplete pending reclassification of documents from groups [G06F 16/78](#) and [G06F 16/7867](#).

Groups [G06F 16/78](#), [G06F 16/7867](#), and [G06F 16/787](#) should be considered in order to perform a complete search.

- 16/80 . of semi-structured data, e.g. markup language structured data such as SGML, XML or HTML ([content-based retrieval of web data G06F 16/95](#))

- 16/81 . . Indexing, e.g. XML tags; Data structures therefor; Storage structures

WARNING

Group [G06F 16/81](#) is incomplete pending reclassification of documents from group [G06F 16/83](#).

Groups [G06F 16/83](#) and [G06F 16/81](#) should be considered in order to perform a complete search.

- 16/83 . . Querying

WARNING

Group [G06F 16/83](#) is impacted by reclassification into groups [G06F 16/81](#) and [G06F 16/835](#).

Groups [G06F 16/83](#), [G06F 16/81](#), and [G06F 16/835](#) should be considered in order to perform a complete search.

- 16/832 . . . Query formulation

- 16/835 . . . Query processing

WARNING

Group [G06F 16/835](#) is incomplete pending reclassification of documents from group [G06F 16/83](#).

Groups [G06F 16/83](#) and [G06F 16/835](#) should be considered in order to perform a complete search.

- 16/8358 {Query translation}

- 16/8365 {Query optimisation}

- 16/8373 {Query execution}

- 16/838 . . . Presentation of query results

- 16/84 . . Mapping; Conversion

- 16/86 . . . {Mapping to a database}

- 16/88 . . . {Mark-up to mark-up conversion ([conversion for visualization in web browsing G06F 16/9577](#))}

- 16/90 . Details of database functions independent of the retrieved data types

NOTE

In groups [G06F 16/90](#), [G06F 16/901](#), [G06F 16/9014](#), [G06F 16/9017](#), [G06F 16/902](#), [G06F 16/9024](#), [G06F 16/9027](#), [G06F 16/903](#), [G06F 16/9032](#), [G06F 16/90324](#), [G06F 16/90328](#), [G06F 16/90332](#), [G06F 16/90335](#), [G06F 16/90339](#), [G06F 16/90344](#), [G06F 16/90348](#), [G06F 16/9035](#), [G06F 16/9038](#), [G06F 16/904](#), and [G06F 16/906](#), subject matter relevant to retrieval characterised by using metadata, when it is determined to be novel and non-obvious, must also be classified in groups [G06F 16/907](#), [G06F 16/907](#), and [G06F 16/909](#).

G06F

G06F 16/90
(continued)

WARNING

Group [G06F 16/90](#) is impacted by reclassification into group [G06F 16/906](#).

Groups [G06F 16/90](#) and [G06F 16/906](#) should be considered in order to perform a complete search.

- 16/901 . . Indexing; Data structures therefor; Storage structures (for retrieval from the web [G06F 16/951](#))
- 16/9014 . . . {hash tables}
- 16/9017 . . . {using directory or table look-up (use of a directory or look-up table in file systems [G06F 16/13](#))}
- 16/902 {using more than one table in sequence, i.e. systems with three or more layers}
- 16/9024 . . . {Graphs; Linked lists ([G06F 16/9027](#) takes precedence)}
- 16/9027 . . . {Trees}
- 16/903 . . Querying (for retrieval from the web [G06F 16/953](#))

WARNING

Group [G06F 16/903](#) is impacted by reclassification into group [G06F 16/9035](#).

Groups [G06F 16/903](#) and [G06F 16/9035](#) should be considered in order to perform a complete search.

- 16/9032 . . . Query formulation
- 16/90324 {using system suggestions}
- 16/90328 {using search space presentation or visualization, e.g. category or range presentation and selection}
- 16/90332 {Natural language query formulation or dialogue systems}
- 16/90335 . . . {Query processing}
- 16/90339 {by using parallel associative memories or content-addressable memories}
- 16/90344 {by using string matching techniques}
- 16/90348 {by searching ordered data, e.g. alpha-numerically ordered data}
- 16/9035 . . . Filtering based on additional data, e.g. user or group profiles

WARNING

Group [G06F 16/9035](#) is incomplete pending reclassification of documents from group [G06F 16/903](#).

Groups [G06F 16/903](#) and [G06F 16/9035](#) should be considered in order to perform a complete search.

- 16/9038 . . . Presentation of query results
- 16/904 . . Browsing; Visualisation therefor (for navigating the web [G06F 16/954](#); browsing optimisation for the web [G06F 16/957](#))

- 16/906 . . Clustering; Classification

WARNING

Group [G06F 16/906](#) is incomplete pending reclassification of documents from group [G06F 16/90](#).

Groups [G06F 16/90](#) and [G06F 16/906](#) should be considered in order to perform a complete search.

- 16/907 . . Retrieval characterised by using metadata, e.g. metadata not derived from the content or metadata generated manually

WARNING

Group [G06F 16/907](#) is impacted by reclassification into groups [G06F 16/908](#) and [G06F 16/909](#).

Groups [G06F 16/907](#), [G06F 16/908](#), and [G06F 16/909](#) should be considered in order to perform a complete search.

- 16/908 . . . using metadata automatically derived from the content

WARNING

Group [G06F 16/908](#) is incomplete pending reclassification of documents from group [G06F 16/907](#).

Groups [G06F 16/907](#) and [G06F 16/908](#) should be considered in order to perform a complete search.

- 16/909 . . . using geographical or spatial information, e.g. location (spatiotemporally dependent retrieval from the web [G06F 16/9537](#))

WARNING

Group [G06F 16/909](#) is incomplete pending reclassification of documents from group [G06F 16/907](#).

Groups [G06F 16/907](#) and [G06F 16/909](#) should be considered in order to perform a complete search.

- 16/93 . . Document management systems
- 16/94 . . . {Hypermedia (hyperlinking within text processing [G06F 17/2235](#))}

- 16/95 . . Retrieval from the web
- 16/951 . . . Indexing; Web crawling techniques

WARNING

Group [G06F 16/951](#) is impacted by reclassification into groups [G06F 16/953](#), [G06F 16/9532](#) and [G06F 16/9538](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 16/953 . . . Querying, e.g. by the use of web search engines
WARNING
 Group [G06F 16/953](#) is incomplete pending reclassification of documents from group [G06F 16/951](#).
 Groups [G06F 16/951](#) and [G06F 16/953](#) should be considered in order to perform a complete search.
- 16/9532 Query formulation
WARNING
 Group [G06F 16/9532](#) is incomplete pending reclassification of documents from group [G06F 16/951](#).
 Groups [G06F 16/951](#) and [G06F 16/9532](#) should be considered in order to perform a complete search.
- 16/9535 Search customisation based on user profiles and personalisation
WARNING
 Group [G06F 16/9535](#) is impacted by reclassification into groups [G06F 16/9536](#) and [G06F 16/9538](#).
 Groups [G06F 16/9535](#), [G06F 16/9536](#), and [G06F 16/9538](#) should be considered in order to perform a complete search.
- 16/9536 Search customisation based on social or collaborative filtering
WARNING
 Group [G06F 16/9536](#) is incomplete pending reclassification of documents from group [G06F 16/9535](#).
 Groups [G06F 16/9535](#) and [G06F 16/9536](#) should be considered in order to perform a complete search.
- 16/9537 Spatial or temporal dependent retrieval, e.g. spatiotemporal queries
- 16/9538 Presentation of query results
WARNING
 Group [G06F 16/9538](#) is incomplete pending reclassification of documents from groups [G06F 16/951](#) and [G06F 16/9535](#).
 Groups [G06F 16/951](#), [G06F 16/9535](#), and [G06F 16/9538](#) should be considered in order to perform a complete search.
- 16/954 . . . Navigation, e.g. using categorised browsing
- 16/955 . . . using information identifiers, e.g. uniform resource locators [URL]
- 16/9554 {by using bar codes}
- 16/9558 {Details of hyperlinks; Management of linked annotations}
- 16/9562 {Bookmark management}
- 16/9566 {URL specific, e.g. using aliases, detecting broken or misspelled links}
- 16/957 . . . Browsing optimisation, e.g. caching or content distillation
- 16/9574 {of access to content, e.g. by caching}
- 16/9577 {Optimising the visualization of content, e.g. distillation of HTML documents}
- 16/958 . . . Organisation or management of web site content, e.g. publishing, maintaining pages or automatic linking
- 16/972 {Access to data in other repository systems, e.g. legacy data or dynamic Web page generation}
- 16/986 {Document structures and storage, e.g. HTML extensions}
- 17/00 Digital computing or data processing equipment or methods, specially adapted for specific functions** (information retrieval, database structures or file system structures therefor [G06F 16/00](#))
- 17/10 . Complex mathematical operations {(function generation by table look-up [G06F 1/03](#); evaluation of elementary functions by calculation [G06F 7/544](#))}
- 17/11 . . for solving equations {, e.g. nonlinear equations, general mathematical optimization problems (optimization specially adapted for a specific administrative, business or logistic context [G06Q 10/04](#))}
- 17/12 . . . Simultaneous equations {, e.g. systems of linear equations}
- 17/13 . . . Differential equations (using digital differential analysers [G06F 7/64](#))
- 17/14 . . Fourier, Walsh or analogous domain transformations {, e.g. Laplace, Hilbert, Karhunen-Loeve, transforms (for correlation function computation [G06F 17/156](#); spectrum analysers [G01R 23/16](#))}
- 17/141 . . . {Discrete Fourier transforms}
- 17/142 {Fast Fourier transforms, e.g. using a Cooley-Tukey type algorithm}
- 17/144 {Prime factor Fourier transforms, e.g. Winograd transforms, number theoretic transforms}
- 17/145 . . . {Square transforms, e.g. Hadamard, Walsh, Haar, Hough, Slant transforms}
- 17/147 . . . {Discrete orthonormal transforms, e.g. discrete cosine transform, discrete sine transform, and variations therefrom, e.g. modified discrete cosine transform, integer transforms approximating the discrete cosine transform ([G06F 17/145](#) takes precedence)}
- 17/148 . . . {Wavelet transforms}
- 17/15 . . Correlation function computation {including computation of convolution operations (arithmetic circuits for sum of products *per se*, e.g. multiply-accumulators [G06F 7/5443](#); digital filters, e.g. FIR, IIR, adaptive filters [H03H 17/00](#))}
- 17/153 . . . {Multidimensional correlation or convolution}
- 17/156 . . . {using a domain transform, e.g. Fourier transform, polynomial transform, number theoretic transform}
- 17/16 . . Matrix or vector computation {, e.g. matrix-matrix or matrix-vector multiplication, matrix factorization (matrix transposition [G06F 7/78](#))}
- 17/17 . . Function evaluation by approximation methods, e.g. inter- or extrapolation, smoothing, least mean square method ({[G06F 17/18](#) takes precedence} ; interpolation for numerical control [G05B 19/18](#))

- 17/175 . . . {of multidimensional data}
- 17/18 . . for evaluating statistical data {, e.g. average values, frequency distributions, probability functions, regression analysis ([forecasting specially adapted for a specific administrative, business or logistic context G06Q 10/04](#))}
- 17/20 . Handling natural language data ([speech analysis or synthesis G10L](#))
- 17/21 . . Text processing ([G06F 17/27](#), [G06F 17/28](#) take precedence; systems for composing machines [B41B 27/00](#))
- 17/211 . . . {Formatting, i.e. changing of presentation of document ([G06F 17/25](#), [G06F 17/26](#) take precedence)}
- 17/212 {Display of layout of document; Preview}
- 17/214 {Font handling; Temporal and kinetic typography}
- 17/215 {Mathematical or scientific, subscripts, superscripts}
- 17/217 {Pagination}
- 17/218 {Tagging; Marking up ([details of markup languages G06F 17/22](#)); Designating a block; Setting of attributes ([style sheets, e.g. eXtensible Stylesheet Language Transformation \(XSL-T\) G06F 17/227](#))}
- 17/22 . . . Manipulating or registering by use of codes, e.g. in sequence of text characters {([compression H03M 7/30](#))}
- 17/2205 {Storage facilities}
- 17/2211 {Calculation of differences between files}
- 17/2217 {Character encodings}
- 17/2223 {Handling non-latin characters, e.g. kana-to-kanji conversion}
- 17/2229 {Fragmentation of text-files, e.g. reusable text-blocks, including linking to the fragments, XInclude, Namespaces}
- 17/2235 {Hyperlinking ([information retrieval based on hyperlinks G06F 16/94](#))}
- 17/2241 {Hierarchical processing, e.g. outlines}
- 17/2247 {Tree structured documents; Markup, e.g. Standard Generalized Markup Language [SGML], Document Type Definition [DTD] ([validation and parsing G06F 17/2705](#); [data retrieval G06F 16/00](#); [coding and compression H03M 7/30](#))}
- 17/2252 {Coding or compression of tree-structured data ([coding and compression in general H03M 7/30](#))}
- 17/2258 {Adaptation of the text data for streaming purposes, e.g. XStream}
- 17/2264 {Transformation}
- 17/227 {Tree transformation for tree-structured or markup documents, e.g. eXtensible Stylesheet Language Transformation (XSL-T) stylesheets, Omnimark, Balise}
- 17/2276 {using dictionaries or tables}
- 17/2282 {Automatic learning of transformation rules, e.g. by example}
- 17/2288 {Version control}
- 17/2294 {Handling of whitespace}
- 17/24 . . . Editing, e.g. insert/delete {([G06F 17/22](#) takes precedence)}
- 17/241 {Annotation, e.g. comment data, footnotes}
- 17/242 {by use of digital ink}
- 17/243 {Form filling; Merging, e.g. graphical processing of form or text}
- 17/245 {Tables; Ruled lines}
- 17/246 {Spreadsheets ([relational data bases G06F 16/284](#); [form-filling G06F 17/243](#))}
- 17/247 {Tabulation, e.g. one dimensional positioning}
- 17/248 {Templates}
- 17/25 . . . Automatic justification
- 17/26 . . . Automatic hyphenation
- 17/27 . . Automatic analysis, e.g. parsing {([speech recognition, analysis or synthesis G10L](#))}
- 17/2705 . . . {Parsing}
- 17/271 {Syntactic parsing, e.g. based on context-free grammar [CFG], unification grammars}
- 17/2715 {Statistical methods}
- 17/272 {Parsing markup language streams ([streaming G06F 17/2258](#))}
- 17/2725 {Validation}
- 17/273 . . . {Orthographic correction, e.g. spelling checkers, vowelisation}
- 17/2735 . . . {Dictionaries}
- 17/274 . . . {Grammatical analysis; Style critique}
- 17/2745 . . . {Heading extraction; Automatic titling, numbering}
- 17/275 . . . {Language Identification}
- 17/2755 . . . {Morphological analysis}
- 17/276 . . . {Stenotyping, code gives word, guess-ahead for partial word input}
- 17/2765 . . . {Recognition}
- 17/277 {Lexical analysis, e.g. tokenisation, collocates}
- 17/2775 {Phrasal analysis, e.g. finite state techniques, chunking}
- 17/278 {Named entity recognition}
- 17/2785 . . . {Semantic analysis}
- 17/279 {Discourse representation}
- 17/2795 . . . {Thesaurus; Synonyms}
- 17/28 . . Processing or translating of natural language ([G06F 17/27](#) takes precedence)
- 17/2809 . . . {Data driven translation}
- 17/2818 {Statistical methods, e.g. probability models}
- 17/2827 {Example based machine translation; Alignment}
- 17/2836 {Machine assisted translation, e.g. translation memory}
- 17/2845 {Using very large corpora, e.g. the world wide web [WWW]}
- 17/2854 . . . {Translation evaluation}
- 17/2863 . . . {Processing of non-latin text ([kana-to-kanji conversion G06F 17/2223](#), [vowelisation G06F 17/273](#))}
- 17/2872 . . . {Rule based translation}
- 17/2881 {Natural language generation}
- 17/289 . . . {Use of machine translation, e.g. multi-lingual retrieval, server side translation for client devices, real-time translation ([data retrieval G06F 16/00](#), [administrative and business methods G06Q 10/00](#), [G06Q 30/00](#))}

- 17/40 . Data acquisition and logging (for input to computer [G06F 3/00](#) {; displays as computer output [G06F 3/14](#); for image data processing [G06T 9/00](#); compression in general [H03M 7/30](#); for transmission [H04B 1/66](#); for pictorial communication [H04N](#); arrangements in telecontrol or telemetry systems for selectively calling a substation from a main station [H04Q 9/00](#)))

WARNING

This group is no longer used for the classification of new documents. The documents are classified in the application fields according to the references above

- 17/50 . Computer-aided design
- 17/5004 . . {Architectural design, e.g. building design}
- 17/5009 . . {using simulation}
- 17/5013 . . . {using petri net models}
- 17/5018 . . . {using finite difference methods or finite element methods (picture mesh generation [G06T 17/20](#))}
- 17/5022 . . . {Logic simulation, e.g. for logic circuit operation (fault-simulation [G06F 11/261](#); test pattern synthesising [G06F 11/263](#))}
- 17/5027 {Logic emulation using reprogrammable logic devices, e.g. field programmable gate arrays [FPGA]}
- 17/5031 {Timing analysis}
- 17/5036 . . . {for analog modelling, e.g. for circuits, spice programme, direct methods, relaxation methods}
- 17/504 . . . {Formal methods}
- 17/5045 . . {Circuit design ([G06F 17/5068](#) takes precedence; logic circuits [H03K 19/00](#))}
- 17/505 . . . {Logic synthesis, e.g. technology mapping, optimisation}
- 17/5054 . . . {for user-programmable logic devices, e.g. field programmable gate arrays [FPGA]}
- 17/5059 . . . {Delay-insensitive circuit design, e.g. asynchronous, self-timed}
- 17/5063 . . . {Analog circuit design, e.g. amplifiers}
- 17/5068 . . {Physical circuit design, e.g. layout for integrated circuits or printed circuit boards}
- 17/5072 . . . {Floorplanning, e.g. partitioning, placement}
- 17/5077 . . . {Routing}
- 17/5081 . . . {Layout analysis, e.g. layout verification, design rule check}
- 17/5086 . . {Mechanical design, e.g. parametric or variational design}
- 17/509 . . {Network design, e.g. positioning, routing, graphs (circuit design [G06F 17/5068](#))}
- 17/5095 . . {Vehicle design, e.g. aircraft or automotive design}

- 19/00 Digital computing or data processing equipment or methods, specially adapted for specific applications** (specially adapted for specific functions [G06F 17/00](#); data processing systems or methods specially adapted for administrative, commercial, financial, managerial, supervisory or forecasting purposes [G06Q](#); healthcare informatics [G16H](#))

NOTE

This group only covers specific applications related to the fields of healthcare or life sciences,

e.g. bioinformatics ([G09F 19/10](#)), medical informatics ([G06F 19/30](#)), or chemoinformatics ([G06F 19/70](#)).

- 19/10 . Bioinformatics, i.e. methods or systems for genetic or protein-related data processing in computational molecular biology (in silico methods of screening virtual chemical libraries [C40B 30/02](#); in silico or mathematical methods of creating virtual chemical libraries [C40B 50/02](#))

NOTES

1. This group also covers bioinformatics methods or systems where digital data processing is inherent or implicit, but not explicitly mentioned.
2. In this group, the following term is used with the meaning indicated:
 - "systems" include apparatus.
3. In this group, the first place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the first appropriate place.

- 19/12 . . for modelling or simulation in systems biology, e.g. probabilistic or dynamic models, gene-regulatory networks, protein interaction networks or metabolic networks
- 19/14 . . for phylogeny or evolution, e.g. evolutionarily conserved regions determination or phylogenetic tree construction
- 19/16 . . for molecular structure, e.g. structure alignment, structural or functional relations, protein folding, domain topologies, drug targeting using structure data, involving two-dimensional or three-dimensional structures
- 19/18 . . for functional genomics or proteomics, e.g. genotype-phenotype associations, linkage disequilibrium, population genetics, binding site identification, mutagenesis, genotyping or genome annotation, protein-protein interactions or protein-nucleic acid interactions
- 19/20 . . for hybridisation or gene expression, e.g. microarrays, sequencing by hybridisation, normalisation, profiling, noise correction models, expression ratio estimation, probe design or probe optimisation
- 19/22 . . for sequence comparison involving nucleotides or amino acids, e.g. homology search, motif or Single-Nucleotide Polymorphism [SNP] discovery or sequence alignment
- 19/24 . . for machine learning, data mining or biostatistics, e.g. pattern finding, knowledge discovery, rule extraction, correlation, clustering or classification
- 19/26 . . for data visualisation, e.g. graphics generation, display of maps or networks or other visual representations
- 19/28 . . for programming tools or database systems, e.g. ontologies, heterogeneous data integration, data warehousing or computing architectures

- 19/30 . {Medical informatics, i.e. computer-based
(Frozen) analysis or dissemination of patient or disease data (bioinformatics [G06F 19/10](#); measuring for diagnostic purposes [A61B 5/00](#); recognising patterns in biomedical signals [G06K 9/00496](#); data processing systems or methods specially adapted for administrative or managerial aspects of healthcare or welfare [G06Q 50/22](#))}

WARNING

Group [G06F 19/30](#) is no longer used for the classification of documents as of January 1, 2018. The content of this group is being reclassified into groups [G16H 10/00](#) – [G16H 80/00](#).

Groups [G06F 19/30](#) and [G16H 10/00](#) – [G16H 80/00](#) should be considered in order to perform a complete search.

- 19/32 . . {Medical data management, e.g. systems or
(Frozen) protocols for archival or communication of medical images, computerised patient records or computerised general medical references (information retrieval or databases *per se* [G06F 16/00](#); data security aspects [G06F 21/00](#))}

WARNING

Group [G06F 19/32](#) is no longer used for the classification of documents as of January 1, 2018. The content of this group is being reclassified into groups [G16H 10/00](#) – [G16H 80/00](#).

Groups [G06F 19/32](#) and [G16H 10/00](#) – [G16H 80/00](#) should be considered in order to perform a complete search.

- 19/321 . . . {Management of medical image data, e.g.
(Frozen) communication or archiving systems such as picture archiving and communication systems [PACS] or related medical protocols such as digital imaging and communications in medicine protocol [DICOM]; Editing of medical image data, e.g. adding diagnosis information (image data processing in general [G06T](#), image data processing related to 3D objects [G06F 17/00](#); biomedical image inspection [G06T 7/0012](#))}

WARNING

Group [G06F 19/321](#) is no longer used for the classification of documents as of January 1, 2018. The content of this group is being reclassified into groups [G16H 30/00](#) – [G16H 30/40](#).

Groups [G06F 19/321](#) and [G16H 30/00](#) – [G16H 30/40](#) should be considered in order to perform a complete search.

- 19/324 . . . {Management of patient independent data, e.g.
(Frozen) medical references in digital format}

WARNING

Group [G06F 19/324](#) is no longer used for the classification of documents as of January 1, 2018. The content of this group is being reclassified into groups [G16H 70/00](#) and [G16H 70/60](#).

Groups [G06F 19/324](#), [G16H 70/00](#), and [G16H 70/60](#) should be considered in order to perform a complete search.

- 19/325 {Medical practices, e.g. general treatment
(Frozen) protocols}

WARNING

Group [G06F 19/325](#) is no longer used for the classification of documents as of January 1, 2018. The content of this group is being reclassified into groups [G16H 70/20](#) and [G16H 70/60](#).

Groups [G06F 19/325](#), [G16H 70/20](#), and [G16H 70/60](#) should be considered in order to perform a complete search.

- 19/326 {Medication information, e.g. drug reference
(Frozen) databases}

WARNING

Group [G06F 19/326](#) is no longer used for the classification of documents as of January 1, 2018. The content of this group is being reclassified into groups [G16H 70/40](#) and [G16H 70/60](#).

Groups [G06F 19/326](#), [G16H 70/40](#), and [G16H 70/60](#) should be considered in order to perform a complete search.

- 19/328 . . . {Health insurance management, e.g. payments
(Frozen) or protection against fraud}

WARNING

Group [G06F 19/328](#) is no longer used for the classification of documents as of January 1, 2018. The content of this group is being reclassified into groups [G06Q 10/10](#) and [G06Q 40/08](#).

Groups [G06F 19/328](#), [G06Q 10/10](#) and [G06Q 40/08](#) should be considered in order to perform a complete search.

- 19/34 . . . {Computer-assisted medical diagnosis or treatment, e.g. computerised prescription or delivery of medication or diets, computerised local control of medical devices, medical expert systems or telemedicine}

WARNING

Group [G06F 19/34](#) is no longer used for the classification of documents as of January 1, 2018. The content of this group is being reclassified into groups [G16H 10/00](#) – [G16H 80/00](#). Groups [G06F 19/34](#) and [G16H 10/00](#) – [G16H 80/00](#) should .

Groups [G06F 19/34](#) and [G16H 10/00](#) – [G16H 80/00](#) should be considered in order to perform a complete search.

- 19/3418 . . . {Telemedicine, e.g. remote diagnosis, remote control of instruments or remote monitoring of patient carried devices}

WARNING

Group [G06F 19/3418](#) is no longer used for the classification of documents as of January 1, 2018. The content of this group is being reclassified into groups [G16H 40/40](#), [G16H 40/60](#), [G16H 40/67](#).

Groups [G06F 19/3418](#), [G16H 40/40](#), [G16H 40/60](#), and [G16H 40/67](#) should be considered in order to perform a complete search.

- 19/3456 . . . {Computer-assisted prescription or delivery of medication, e.g. prescription filling or compliance checking}

WARNING

Group [G06F 19/3456](#) is no longer used for the classification of documents as of January 1, 2018. The content of this group is being reclassified into groups [G16H 20/10](#), [G16H 20/60](#), [G16H 20/70](#), and [G16H 20/90](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 19/3462 {Computer-assisted distribution of medication from dispensers, i.e. making sure that medication is correctly delivered to patients ([medication containers A61J 1/00](#); dispensers activated by money or the like [G07F](#))}

WARNING

Group [G06F 19/3462](#) is no longer used for the classification of documents as of January 1, 2018. The content of this group is being reclassified into groups [G16H 20/13](#), [G16H 20/60](#), [G16H 20/70](#), and [G16H 20/90](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 19/3468 {Computer-assisted delivery of medication via infusion or injection ([infusion devices per se A61M 5/14](#))}

WARNING

Group [G06F 19/3468](#) is no longer used for the classification of documents as of January 1, 2018. The content of this group is being reclassified into groups [G16H 20/17](#), [G16H 20/60](#), [G16H 20/70](#), and [G16H 20/90](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 19/3475 . . . {Computer-assisted prescription or delivery of diets, e.g. prescription filling or compliance checking}

WARNING

Group [G06F 19/3475](#) is no longer used for the classification of documents as of January 1, 2018. The content of this group is being reclassified into groups [G16H 20/60](#), [G16H 20/70](#) and [G16H 20/90](#).

Groups [G06F 19/3475](#), [G16H 20/60](#), [G16H 20/70](#) and [G16H 20/90](#) should be considered in order to perform a complete search.

- 19/3481 . . . {Computer-assisted prescription or delivery of treatment by physical action, e.g. surgery or physical exercise ([surgical instruments, devices or methods A61B 17/00](#); apparatuses for physical training [A63B](#))}

WARNING

Group [G06F 19/3481](#) is no longer used for the classification of documents as of January 1, 2018. The content of this group is being reclassified into groups [G16H 20/30](#), [G16H 20/40](#), [G16H 20/70](#) and [G16H 20/90](#).

Groups [G06F 19/3481](#), [G16H 20/30](#), [G16H 20/40](#), [G16H 20/70](#) and [G16H 20/90](#) should be considered in order to perform a complete search.

- 19/36 . . {Computer-assisted acquisition of medical data, e.g. computerised clinical trials or questionnaires ([measuring analogue medical signals A61B 5/00](#))}

WARNING

Group [G06F 19/36](#) is no longer used for the classification of documents as of January 1, 2018. The content of this group is being reclassified into groups [G16H 10/00](#) – [G16H 10/40](#).

Groups [G06F 19/36](#) and [G16H 10/00](#) – [G16H 10/40](#) should be considered in order to perform a complete search.

19/70	<ul style="list-style-type: none"> {Chemoinformatics, i.e. data processing methods or systems for the retrieval, analysis, visualisation, or storage of physicochemical or structural data of chemical compounds (in silico methods of screening virtual chemical libraries C40B 30/02; in silico or mathematical methods of creating virtual chemical libraries C40B 50/02; computer-aided design per se G06F 17/50; bioinformatics G06F 19/10; processing of 2D or 3D images G06T)} 	21/121	<ul style="list-style-type: none"> . . . {Restricting unauthorised execution of programs}
19/701	<ul style="list-style-type: none"> . . {for molecular modelling, e.g. calculation and theoretical details of quantum mechanics, molecular mechanics, molecular dynamics, Monte Carlo methods, conformational analysis or the like (molecular modelling of nucleic acids or proteins G06F 19/16)} 	21/123	<ul style="list-style-type: none"> {by using dedicated hardware, e.g. dongles, smart cards, cryptographic processors, global positioning systems [GPS] devices}
19/702	<ul style="list-style-type: none"> . . {for analysis and planning of chemical reactions and syntheses, e.g. synthesis design, reaction prediction, mechanism elucidation} 	21/125	<ul style="list-style-type: none"> {by manipulating the program code, e.g. source code, compiled code, interpreted code, machine code}
19/703	<ul style="list-style-type: none"> . . {for computer-assisted identification of chemical compounds or molecular structures, e.g. computer-assisted structure elucidation [CASE] systems} 	21/126	<ul style="list-style-type: none"> {Interacting with the operating system}
19/704	<ul style="list-style-type: none"> . . {for prediction of properties of compounds, e.g. calculating and selecting molecular descriptors, details related to the development of SAR/QSAR/QSPR models, ADME/Tox models or PK/PD models} 	21/128	<ul style="list-style-type: none"> {involving web programs, i.e. using technology especially used in internet, generally interacting with a web browser, e.g. hypertext markup language [HTML], applets, java}
19/705	<ul style="list-style-type: none"> . . {for database search of chemical structures, e.g. full structure search, substructure search, similarity search, pharmacophore search, 3D structure search (information retrieval in general G06F17/30)} 	21/14	<ul style="list-style-type: none"> . . . against software analysis or reverse engineering, e.g. by obfuscation
19/706	<ul style="list-style-type: none"> . . {for drug design with the emphasis on a therapeutic agent, e.g. ligand-biological target interactions, pharmacophore generation (drug targeting using protein structure data G06F 19/16; binding site identification G06F 19/18)} 	21/16	<ul style="list-style-type: none"> . . Program or content traceability, e.g. by watermarking (digital watermarking on images H04N 1/32)
19/707	<ul style="list-style-type: none"> . . {using machine learning, data mining or chemometrics, e.g. pattern recognition, knowledge discovery, rule extraction, correlation, clustering or classification, chemical name to structure conversion (use of machine learning, data mining or biostatistics for processing genetic or protein-related data G06F 19/24)} 	21/30	<ul style="list-style-type: none"> . Authentication, i.e. establishing the identity or authorisation of security principals
19/708	<ul style="list-style-type: none"> . . {for data visualisation, e.g. molecular structure representations, graphics generation, display of maps or networks or other visual representations (data visualisation specially adapted for processing genetic or protein-related data G06F 19/26)} 	21/305	<ul style="list-style-type: none"> . . {by remotely controlling device operation}
19/709	<ul style="list-style-type: none"> . . {for programming tools or database systems, e.g. ontologies, heterogeneous data integration, data warehousing or computing architectures (programming tools or database systems specially adapted for processing genetic or protein-related data G06F 19/28)} 	21/31	<ul style="list-style-type: none"> . . User authentication
21/00	Security arrangements for protecting computers, components thereof, programs or data against unauthorised activity	21/313	<ul style="list-style-type: none"> . . . {using a call-back technique via a telephone network}
21/10	<ul style="list-style-type: none"> . Protecting distributed programs or content, e.g. vending or licensing of copyrighted material 	21/316	<ul style="list-style-type: none"> {by observing the pattern of computer usage, e.g. typical user behaviour}
21/105	<ul style="list-style-type: none"> . . {Tools for software license management or administration, e.g. managing licenses at corporate level} 	21/32	<ul style="list-style-type: none"> . . . using biometric data, e.g. fingerprints, iris scans or voiceprints
21/12	<ul style="list-style-type: none"> . . Protecting executable software 	21/33	<ul style="list-style-type: none"> . . . using certificates
		21/335	<ul style="list-style-type: none"> {for accessing specific resources, e.g. using Kerberos tickets}
		21/34	<ul style="list-style-type: none"> . . . involving the use of external additional devices, e.g. dongles or smart cards
		21/35	<ul style="list-style-type: none"> communicating wirelessly
		21/36	<ul style="list-style-type: none"> . . . by graphic or iconic representation
		21/40	<ul style="list-style-type: none"> . . . by quorum, i.e. whereby two or more security principals are required
		21/41	<ul style="list-style-type: none"> . . . where a single sign-on provides access to a plurality of computers
		21/42	<ul style="list-style-type: none"> . . . using separate channels for security data
		21/43	<ul style="list-style-type: none"> wireless channels
		21/44	<ul style="list-style-type: none"> . . Program or device authentication
		21/445	<ul style="list-style-type: none"> . . . {by mutual authentication, e.g. between devices or programs}
		21/45	<ul style="list-style-type: none"> . . Structures or tools for the administration of authentication
		21/46	<ul style="list-style-type: none"> . . . by designing passwords or checking the strength of passwords
		21/50	<ul style="list-style-type: none"> . Monitoring users, programs or devices to maintain the integrity of platforms, e.g. of processors, firmware or operating systems
		21/51	<ul style="list-style-type: none"> . . at application loading time, e.g. accepting, rejecting, starting or inhibiting executable software based on integrity or source reliability
		21/52	<ul style="list-style-type: none"> . . during program execution, e.g. stack integrity {; Preventing unwanted data erasure; Buffer overflow}
		21/53	<ul style="list-style-type: none"> . . . by executing in a restricted environment, e.g. sandbox or secure virtual machine
		21/54	<ul style="list-style-type: none"> . . . by adding security routines or objects to programs
		21/55	<ul style="list-style-type: none"> . . Detecting local intrusion or implementing counter-measures

- 21/552 . . . {involving long-term monitoring or reporting}
 - 21/554 . . . {involving event detection and direct action}
 - 21/556 . . . {involving covert channels, i.e. data leakage between processes (inhibiting the analysis of circuitry or operation with measures against power attack [G06F 21/755](#))}
 - 21/56 . . . Computer malware detection or handling, e.g. anti-virus arrangements
 - 21/561 {Virus type analysis}
 - 21/562 {Static detection}
 - 21/563 {by source code analysis}
 - 21/564 {by virus signature recognition}
 - 21/565 {by checking file integrity}
 - 21/566 {Dynamic detection, i.e. detection performed at run-time, e.g. emulation, suspicious activities}
 - 21/567 {using dedicated hardware}
 - 21/568 {eliminating virus, restoring damaged files}
 - 21/57 . . . Certifying or maintaining trusted computer platforms, e.g. secure boots or power-downs, version controls, system software checks, secure updates or assessing vulnerabilities
- WARNING**
- Group [G06F 21/57](#) - [G06F 21/577](#) is incomplete pending reclassification of documents from groups [G06F 8/65](#), [G06F 8/71](#), and [G06F 9/445](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 21/572 . . . {Secure firmware programming, e.g. of basic input output system [BIOS]}
 - 21/575 . . . {Secure boot}
 - 21/577 . . . {Assessing vulnerabilities and evaluating computer system security}
 - 21/60 . . . Protecting data
 - 21/602 . . . {Providing cryptographic facilities or services}
 - 21/604 . . . {Tools and structures for managing or administering access control systems}
 - 21/606 . . . {by securing the transmission between two devices or processes}
 - 21/608 . . . {Secure printing}
 - 21/62 . . . Protecting access to data via a platform, e.g. using keys or access control rules
 - 21/6209 . . . {to a single file or object, e.g. in a secure envelope, encrypted and accessed using a key, or with access control rules appended to the object itself}
 - 21/6218 . . . {to a system of files or objects, e.g. local or distributed file system or database}
 - 21/6227 {where protection concerns the structure of data, e.g. records, types, queries}
 - 21/6236 {between heterogeneous systems}
 - 21/6245 {Protecting personal data, e.g. for financial or medical purposes}
 - 21/6254 {by anonymising data, e.g. decorrelating personal data from the owner's identification}
 - 21/6263 {during internet communication, e.g. revealing personal data from cookies}
 - 21/6272 {by registering files or documents with a third party}
 - 21/6281 {at program execution time, where the protection is within the operating system}
 - 21/629 . . . {to features or functions of an application}
 - 21/64 . . . Protecting data integrity, e.g. using checksums, certificates or signatures
 - 21/645 {using a third party}
 - 21/70 . . . Protecting specific internal or peripheral components, in which the protection of a component leads to protection of the entire computer
 - 21/71 . . . to assure secure computing or processing of information
 - 21/72 . . . in cryptographic circuits
 - 21/725 {operating on a secure reference time value}
 - 21/73 . . . by creating or determining hardware identification, e.g. serial numbers
 - 21/74 . . . operating in dual or compartmented mode, i.e. at least one secure mode
 - 21/75 . . . by inhibiting the analysis of circuitry or operation
- WARNING**
- Group [G06F 21/75](#) is impacted by reclassification into group [G06F 21/755](#).
- Groups [G06F 21/75](#) and [G06F 21/755](#) should be considered in order to perform a complete search.
- 21/755 {with measures against power attack}
- WARNING**
- Group [G06F 21/755](#) is incomplete pending reclassification of documents from group [G06F 21/75](#).
- Groups [G06F 21/75](#) and [G06F 21/755](#) should be considered in order to perform a complete search.
- 21/76 . . . in application-specific integrated circuits [ASICs] or field-programmable devices, e.g. field-programmable gate arrays [FPGAs] or programmable logic devices [PLDs]
 - 21/77 . . . in smart cards
 - 21/78 . . . to assure secure storage of data (address-based protection against unauthorised use of memory [G06F 12/14](#); record carriers for use with machines and with at least a part designed to carry digital markings [G06K 19/00](#))
 - 21/79 . . . in semiconductor storage media, e.g. directly-addressable memories
 - 21/80 . . . in storage media based on magnetic or optical technology, e.g. disks with sectors (preventing unauthorised reproduction or copying of disc-type recordable media [G11B 20/00](#))
 - 21/805 {using a security table for the storage sub-system}
 - 21/81 . . . by operating on the power supply, e.g. enabling or disabling power-on, sleep or resume operations
 - 21/82 . . . Protecting input, output or interconnection devices
 - 21/83 . . . input devices, e.g. keyboards, mice or controllers thereof
 - 21/84 . . . output devices, e.g. displays or monitors
 - 21/85 . . . interconnection devices, e.g. bus-connected or in-line devices
 - 21/86 . . . Secure or tamper-resistant housings

21/87	. . . by means of encapsulation, e.g. for integrated circuits	2201/83	. the solution involving signatures
21/88	. . Detecting or preventing theft or loss	2201/835	. Timestamp
21/88	. . Detecting or preventing theft or loss	2201/84	. Using snapshots, i.e. a logical point-in-time copy of the data
2101/00	Indexing scheme relating to the type of digital function generated	2201/845	. Systems in which the redundancy can be transformed in increased performance
2101/02	. Linear multivariable functions, i.e. sum of products	2201/85	. Active fault masking without idle spares (active fault masking without idle spare hardware where processing functionality is redundant G06F 11/2035)
2101/04	. Trigonometric functions	2201/855	. Details of asynchronous mirroring using a journal to transfer not-yet-mirrored changes
2101/06	. Co-ordinate transformations	2201/86	. Event-based monitoring
2101/08	. Powers or roots	2201/865	. Monitoring of software
2101/10	. Logarithmic or exponential functions	2201/87	. Monitoring of transactions
2101/12	. Reciprocal functions	2201/875	. Monitoring of systems including the internet
2101/14	. Probability distribution functions	2201/88	. Monitoring involving counting
2101/16	. PCM companding functions	2201/885	. Monitoring specific for caches
2200/00	Indexing scheme relating to G06F 1/04 - G06F 1/32	2203/00	Indexing scheme relating to G06F 3/00 - G06F 3/048
2200/16	. Indexing scheme relating to G06F 1/16 - G06F 1/18	2203/01	. Indexing scheme relating to G06F 3/01
2200/161	. . Indexing scheme relating to constructional details of the monitor	2203/011	. . Emotion or mood input determined on the basis of sensed human body parameters such as pulse, heart rate or beat, temperature of skin, facial expressions, iris, voice pitch, brain activity patterns
2200/1611	. . . CRT monitor	2203/012	. . Walk-in-place systems for allowing a user to walk in a virtual environment while constraining him to a given position in the physical environment
2200/1612	. . . Flat panel monitor	2203/013	. . Force feedback applied to a game
2200/1613	. . . Supporting arrangements, e.g. for filters or documents associated to a laptop display	2203/014	. . Force feedback applied to GUI
2200/1614	. . . Image rotation following screen orientation, e.g. switching from landscape to portrait mode	2203/015	. . Force feedback applied to a joystick
2200/163	. . Indexing scheme relating to constructional details of the computer	2203/033	. Indexing scheme relating to G06F 3/033
2200/1631	. . . Panel PC, e.g. single housing hosting PC and display panel	2203/0331	. . Finger worn pointing device
2200/1632	. . . Pen holder integrated in the computer	2203/0332	. . Ergonomic shaped mouse adjustable to suit one of both hands
2200/1633	. . . Protecting arrangement for the entire housing of the computer	2203/0333	. . Ergonomic shaped mouse for one hand
2200/1634	. . . Integrated protective display lid, e.g. for touch-sensitive display in handheld computer	2203/0334	. . Ergonomic shaped mouse for vertical grip, whereby the hand controlling the mouse is resting or gripping it with an attitude almost vertical with respect of the working surface
2200/1635	. . . Stackable modules	2203/0335	. . Finger operated miniaturized mouse
2200/1636	. . . Sensing arrangement for detection of a tap gesture on the housing	2203/0336	. . Mouse integrated fingerprint sensor
2200/1637	. . . Sensing arrangement for detection of housing movement or orientation, e.g. for controlling scrolling or cursor movement on the display of an handheld computer	2203/0337	. . Status LEDs integrated in the mouse to provide visual feedback to the user about the status of the input device, the PC, or the user
2200/1638	. . . Computer housing designed to operate in both desktop and tower orientation	2203/0338	. . Fingerprint track pad, i.e. fingerprint sensor used as pointing device tracking the fingertip image
2200/1639	. . . Arrangements for locking plugged peripheral connectors	2203/0339	. . Touch strips, e.g. orthogonal touch strips to control cursor movement or scrolling; single touch strip to adjust parameter or to implement a row of soft keys
2200/20	. Indexing scheme relating to G06F 1/20	2203/038	. Indexing scheme relating to G06F 3/038
2200/201	. . Cooling arrangements using cooling fluid	2203/0381	. . Multimodal input, i.e. interface arrangements enabling the user to issue commands by simultaneous use of input devices of different nature, e.g. voice plus gesture on digitizer
2200/202	. . Air convective hinge	2203/0382	. . Plural input, i.e. interface arrangements in which a plurality of input device of the same type are in communication with a PC
2200/203	. . Heat conductive hinge		
2200/26	. Indexing scheme relating to G06F 1/26		
2200/261	. . PC controlled powerstrip		
2201/00	Indexing scheme relating to error detection, to error correction, and to monitoring		
2201/80	. Database-specific techniques		
2201/805	. Real-time		
2201/81	. Threshold		
2201/815	. Virtual (middleware or OS functionality using virtual machines to implement generic software techniques for error detection or fault masking G06F 11/1484)		
2201/82	. Solving problems relating to consistency (ensuring consistency in mirrored systems G06F 11/2064)		
2201/825	. the problem or solution involving locking		

- 2203/0383 . . Remote input, i.e. interface arrangements in which the signals generated by a pointing device are transmitted to a PC at a remote location, e.g. to a PC in a LAN
- 2203/0384 . . Wireless input, i.e. hardware and software details of wireless interface arrangements for pointing devices
- 2203/041 . . Indexing scheme relating to [G06F 3/041](#) - [G06F 3/045](#)
- 2203/04101 . . 2.5D-digitiser, i.e. digitiser detecting the X/Y position of the input means, finger or stylus, also when it does not touch, but is proximate to the digitiser's interaction surface and also measures the distance of the input means within a short range in the Z direction, possibly with a separate measurement setup
- 2203/04102 . . Flexible digitiser, i.e. constructional details for allowing the whole digitising part of a device to be flexed or rolled like a sheet of paper
- 2203/04103 . . Manufacturing, i.e. details related to manufacturing processes specially suited for touch sensitive devices
- 2203/04104 . . Multi-touch detection in digitiser, i.e. details about the simultaneous detection of a plurality of touching locations, e.g. multiple fingers or pen and finger
- 2203/04105 . . Separate pressure detection, i.e. detection of pressure applied on the touch surface using additional pressure sensors or switches not interfering with the position sensing process and generally disposed outside of the active touch sensing part
- 2203/04106 . . Multi-sensing digitiser, i.e. digitiser using at least two different sensing technologies simultaneously or alternatively, e.g. for detecting pen and finger, for saving power or for improving position detection
- 2203/04107 . . Shielding in digitiser, i.e. guard or shielding arrangements, mostly for capacitive touchscreens, e.g. driven shields, driven grounds
- 2203/04108 . . Touchless 2D- digitiser, i.e. digitiser detecting the X/Y position of the input means, finger or stylus, also when it does not touch, but is proximate to the digitiser's interaction surface without distance measurement in the Z direction
- 2203/04109 . . FTIR in optical digitiser, i.e. touch detection by frustrating the total internal reflection within an optical waveguide due to changes of optical properties or deformation at the touch location
- 2203/04111 . . Cross over in capacitive digitiser, i.e. details of structures for connecting electrodes of the sensing pattern where the connections cross each other, e.g. bridge structures comprising an insulating layer, or vias through substrate
- 2203/04112 . . Electrode mesh in capacitive digitiser: electrode for touch sensing is formed of a mesh of very fine, normally metallic, interconnected lines that are almost invisible to see. This provides a quite large but transparent electrode surface, without need for ITO or similar transparent conductive material
- 2203/04113 . . Peripheral electrode pattern in resistive digitiser, i.e. electrodes at the periphery of the resistive sheet are shaped in patterns enhancing linearity of induced field
- 2203/048 . . Indexing scheme relating to [G06F 3/048](#)
- 2203/04801 . . Cursor retrieval aid, i.e. visual aspect modification, blinking, colour changes, enlargement or other visual cues, for helping user do find the cursor in graphical user interfaces
- 2203/04802 . . 3D-info-object: information is displayed on the internal or external surface of a three dimensional manipulable object, e.g. on the faces of a cube that can be rotated by the user
- 2203/04803 . . Split screen, i.e. subdividing the display area or the window area into separate subareas
- 2203/04804 . . Transparency, e.g. transparent or translucent windows
- 2203/04805 . . Virtual magnifying lens, i.e. window or frame movable on top of displayed information to enlarge it for better reading or selection
- 2203/04806 . . Zoom, i.e. interaction techniques or interactors for controlling the zooming operation
- 2203/04807 . . Pen manipulated menu
- 2203/04808 . . Several contacts: gestures triggering a specific function, e.g. scrolling, zooming, right-click, when the user establishes several contacts with the surface simultaneously; e.g. using several fingers or a combination of fingers and pen
- 2203/04809 . . Textured surface identifying touch areas, e.g. overlay structure for a virtual keyboard
- 2205/00** . . **Indexing scheme relating to group [G06F 5/00](#); Methods or arrangements for data conversion without changing the order or content of the data handled**
- 2205/003 . . Reformatting, i.e. changing the format of data representation
- 2205/06 . . Indexing scheme relating to groups [G06F 5/06](#) - [G06F 5/16](#)
- 2205/061 . . Adapt frequency, i.e. clock frequency at one side is adapted to clock frequency, or average clock frequency, at the other side; Not pulse stuffing only
- 2205/062 . . Allowing rewriting or rereading data to or from the buffer
- 2205/063 . . Dynamically variable buffer size
- 2205/064 . . Linked list, i.e. structure using pointers, e.g. allowing non-contiguous address segments in one logical buffer or dynamic buffer space allocation
- 2205/065 . . With bypass possibility
- 2205/066 . . User-programmable number or size of buffers, i.e. number of separate buffers or their size can be allocated freely
- 2205/067 . . Bidirectional FIFO, i.e. system allowing data transfer in two directions
- 2205/10 . . Indexing scheme relating to groups [G06F 5/10](#) - [G06F 5/14](#)
- 2205/102 . . Avoiding metastability, i.e. preventing hazards, e.g. by using Gray code counters
- 2205/104 . . Delay lines
- 2205/106 . . Details of pointers, i.e. structure of the address generators
- 2205/108 . . Reading or writing the data blockwise, e.g. using an extra end-of-block pointer
- 2205/12 . . Indexing scheme relating to groups [G06F 5/12](#) - [G06F 5/14](#)
- 2205/123 . . Contention resolution, i.e. resolving conflicts between simultaneous read and write operations

- 2205/126 . . Monitoring of intermediate fill level, i.e. with additional means for monitoring the fill level, e.g. half full flag, almost empty flag
- 2206/00 Indexing scheme related to dedicated interfaces for computers**
- 2206/10 . Indexing scheme related to storage interfaces for computers, indexing schema related to group [G06F 3/06](#)
- 2206/1004 . . Defragmentation
- 2206/1008 . . Graphical user interface [GUI]
- 2206/1012 . . Load balancing
- 2206/1014 . . One time programmable [OTP] memory, e.g. PROM, WORM
- 2206/15 . Indexing scheme related to printer interfaces for computers, indexing schema related to group [G06F 3/12](#)
- 2206/1504 . . Cost estimation
- 2206/1506 . . Degraded mode, e.g. in view of consumables depleted, thresholds reached
- 2206/1508 . . Load balancing
- 2206/151 . . Pre-printed media, e.g. media stock, forms, logos
- 2206/1512 . . Print-to a presentation device other than a printer, e.g. e-reader, e-paper, tablet
- 2206/1514 . . Sub-job
- 2206/20 . Indexing scheme related to audio interfaces for computers, indexing schema related to group [G06F 3/16](#)
- 2207/00 Indexing scheme relating to methods or arrangements for processing data by operating upon the order or content of the data handled**
- 2207/02 . Indexing scheme relating to groups [G06F 7/02](#) - [G06F 7/026](#)
- 2207/025 . . String search, i.e. pattern matching, e.g. find identical word or best match in a string
- 2207/22 . Indexing scheme relating to groups [G06F 7/22](#) - [G06F 7/36](#)
- 2207/222 . . Binary data tree
- 2207/224 . . External sorting
- 2207/226 . . Priority queue, i.e. 1 word in, 1 word out sorter; Output word, i.e. min or max of words in memory
- 2207/228 . . Sorting or merging network
- 2207/38 . Indexing scheme relating to groups [G06F 7/38](#) - [G06F 7/575](#)
- 2207/3804 . . Details (not used)
- 2207/3808 . . . concerning the type of numbers or the way they are handled
- 2207/3812 Devices capable of handling different types of numbers
- 2207/3816 Accepting numbers of variable word length
- 2207/382 Reconfigurable for different fixed word lengths ([multigauge devices G06F 2207/3828](#))
- 2207/3824 Accepting both fixed-point and floating-point numbers
- 2207/3828 Multigauge devices, i.e. capable of handling packed numbers without unpacking them
- 2207/3832 Less usual number representations
- 2207/3836 One's complement
- 2207/384 Octal
- 2207/3844 Hexadecimal
- 2207/3848 Unit distance code
- 2207/3852 Calculation with most significant digit first
- 2207/3856 Operand swapping
- 2207/386 Special constructional features
- 2207/3864 Clockless, i.e. asynchronous operation used as a design principle ([G06F 2207/3888 takes precedence](#))
- 2207/3868 Bypass control, i.e. possibility to transfer an operand unchanged to the output
- 2207/3872 Precharge of output to prevent leakage
- 2207/3876 Alternation of true and inverted stages
- 2207/388 Skewing
- 2207/3884 Pipelining
- 2207/3888 Wave pipelining, i.e. processing multiple subsequent operand sets asynchronously within each pipeline stage
- 2207/3892 Systolic array
- 2207/3896 Bit slicing
- 2207/48 . . Indexing scheme relating to groups [G06F 7/48](#) - [G06F 7/575](#)
- 2207/4802 Special implementations
- 2207/4804 Associative memory or processor
- 2207/4806 Cascode or current mode logic
- 2207/4808 Charge transfer devices
- 2207/481 Counters performing arithmetic operations
- 2207/4812 Multiplexers
- 2207/4814 Non-logic devices, e.g. operational amplifiers
- 2207/4816 Pass transistors
- 2207/4818 Threshold devices
- 2207/482 using capacitive adding networks
- 2207/4822 Majority gates
- 2207/4824 Neural networks
- 2207/4826 using transistors having multiple electrodes of the same type, e.g. multi-emitter devices, neuron-MOS devices
- 2207/4828 Negative resistance devices, e.g. tunnel diodes, gunn effect devices
- 2207/483 . Indexing scheme relating to group [G06F 7/483](#)
- 2207/4835 . . Computations with rational numbers
- 2207/491 . Indexing scheme relating to groups [G06F 7/491](#) - [G06F 7/4917](#)
- 2207/49105 . . Determining 9's or 10's complement
- 2207/4911 . . Decimal floating-point representation
- 2207/49115 . . Duodecimal numbers
- 2207/4912 . . Non-specified BCD representation
- 2207/49125 . . Non-specified decimal representation
- 2207/4913 . . Sterling system, i.e. mixed radix with digit weights of 10-20-12
- 2207/49135 . . Using 036012 or 3612 code, i.e. binary coded decimal representation with digit weight of (0,) 3, 6, (0,) 1 and 2 respectively
- 2207/4914 . . Using 2-out-of-5 code, i.e. binary coded decimal representation with digit weight of 2, 4, 2 and 1 respectively
- 2207/49145 . . Using 2421 code, i.e. non-weighted representation in which 2 out of 5 bits are "1" for each decimal digit
- 2207/4915 . . Using 4221 code, i.e. binary coded decimal representation with digit weight of 4, 2, 2 and 1 respectively
- 2207/49155 . . Using 51111 code, i.e. binary coded decimal representation with digit weight of 5, 1, 1, 1 and 1 respectively

- 2207/4916 . . Using 5211 code, i.e. binary coded decimal representation with digit weight of 5, 2, 1 and 1 respectively
- 2207/49165 . . Using 5311 code, i.e. binary coded decimal representation with digit weight of 5, 3, 1 and 1 respectively
- 2207/4917 . . Using 5321 or 543210 code, i.e. binary coded decimal representation with digit weight of 5,(4), 3, 2, 1 (and 0) respectively
- 2207/49175 . . Using 54321 code, i.e. binary coded decimal representation with digit weight of 5, 4, 3, 2 and 1 respectively
- 2207/4918 . . Using Aiken code, i.e. using both first and last 5 of 16 possible 4-bit values, rendering the code symmetrical within the series of 16 values
- 2207/49185 . . Using biquinary code, i.e. combination of 5-valued and 2-valued digits, having values 0, 1, 2, 3, 4 and 0, 5 or 0, 2, 4, 6, 8 and 0, 1 respectively
- 2207/4919 . . Using excess-3 code, i.e. natural BCD + offset of 3, rendering the code symmetrical within the series of 16 possible 4 bit values
- 2207/49195 . . Using pure decimal representation, e.g. 10-valued voltage signal, 1-out-of-10 code
- 2207/492 . . Indexing scheme relating to groups
[G06F 7/492](#) - [G06F 7/496](#)
- 2207/4921 . . Single digit adding or subtracting
- 2207/4922 . . Multi-operand adding or subtracting
- 2207/4923 . . Incrementer or decrementer
- 2207/4924 . . Digit-parallel adding or subtracting
- 2207/506 . . Indexing scheme relating to groups
[G06F 7/506](#) - [G06F 7/508](#)
- 2207/5063 . . 2-input gates, i.e. only using 2-input logical gates, e.g. binary carry look-ahead, e.g. Kogge-Stone or Ladner-Fischer adder
- 2207/535 . . Indexing scheme relating to groups
[G06F 7/535](#) - [G06F 7/5375](#)
- 2207/5351 . . Multiplicative non-restoring division, e.g. SRT, using multiplication in quotient selection
- 2207/5352 . . Non-restoring division not covered by
[G06F 7/5375](#)
- 2207/5353 . . Restoring division
- 2207/5354 . . Using table lookup, e.g. for digit selection in division by digit recurrence
- 2207/5355 . . Using iterative approximation not using digit recurrence, e.g. Newton Raphson or Goldschmidt
- 2207/5356 . . Via reciprocal, i.e. calculate reciprocal only, or calculate reciprocal first and then the quotient from the reciprocal and the numerator
- 2207/544 . . Indexing scheme relating to group [G06F 7/544](#)
- 2207/5442 . . Absolute difference
- 2207/552 . . Indexing scheme relating to groups
[G06F 7/552](#) - [G06F 7/5525](#)
- 2207/5521 . . Inverse root of a number or a function, e.g. the reciprocal of a Pythagorean sum
- 2207/5523 . . Calculates a power, e.g. the square, of a number or a function, e.g. polynomials
- 2207/5525 . . Pythagorean sum, i.e. the square root of a sum of squares
- 2207/5526 . . Roots or inverse roots of single operands (**not used**)
- 2207/5528 . . . Non-restoring calculation, where each result digit is either negative, zero or positive, e.g. SRT
- 2207/556 . . Indexing scheme relating to group [G06F 7/556](#)
- 2207/5561 . . Exponentiation by multiplication, i.e. calculating $Y^{**}INT(X)$ by multiplying Y with itself or a power of itself, INT(X) being the integer part of X
- 2207/58 . . Indexing scheme relating to groups
[G06F 7/58](#) - [G06F 7/588](#)
- 2207/581 . . Generating an LFSR sequence, e.g. an m-sequence; sequence may be generated without LFSR, e.g. using Galois Field arithmetic
- 2207/582 . . Parallel finite field implementation, i.e. at least partially parallel implementation of finite field arithmetic, generating several new bits or trits per step, e.g. using a GF multiplier
- 2207/583 . . Serial finite field implementation, i.e. serial implementation of finite field arithmetic, generating one new bit or trit per step, e.g. using an LFSR or several independent LFSRs; also includes PRNGs with parallel operation between LFSR and outputs
- 2207/72 . . Indexing scheme relating to groups
[G06F 7/72](#) - [G06F 7/729](#)
- 2207/7204 . . Prime number generation or prime number testing
- 2207/7209 . . Calculation via subfield, i.e. the subfield being GF(q) with q a prime power, e.g. GF((2**m)**n) via GF(2**m)
- 2207/7214 . . Calculation via prime subfield, i.e. the subfield being GF(p) with p an integer prime > 3; e.g. GF(p**k) via GF(p)
- 2207/7219 . . Countermeasures against side channel or fault attacks
- 2207/7223 . . . Randomisation as countermeasure against side channel attacks
- 2207/7228 Random curve mapping, e.g. mapping to an isomorphous or projective curve
- 2207/7233 Masking, e.g. $(A^{**}e)+r \bmod n$
- 2207/7238 Operand masking, i.e. message blinding, e.g. $(A+r)^{**}e \bmod n$; $k.(P+R)$
- 2207/7242 Exponent masking, i.e. key masking, e.g. $A^{**}(e+r) \bmod n$; $(k+r).P$
- 2207/7247 Modulo masking, e.g. $A^{**}e \bmod (n*r)$
- 2207/7252 of operation order, e.g. starting to treat the exponent at a random place, or in a randomly chosen direction
- 2207/7257 Random modification not requiring correction
- 2207/7261 . . . Uniform execution, e.g. avoiding jumps, or using formulae with the same power profile
- 2207/7266 . . . Hardware adaptation, e.g. dual rail logic; calculate add and double simultaneously
- 2207/7271 . . . Fault verification, e.g. comparing two values which should be the same, unless a computational fault occurred
- 2207/7276 . . Additional details of aspects covered by group
[G06F 7/723](#)
- 2207/728 . . . using repeated square-and-multiply, i.e. right-to-left binary exponentiation
- 2207/7285 . . . using the window method, i.e. left-to-right k-ary exponentiation
- 2207/729 Sliding-window exponentiation
- 2207/7295 . . . using an addition chain, or an addition-subtraction chain
- 2209/00 . . Indexing scheme relating to [G06F 9/00](#)
- 2209/46 . . Indexing scheme relating to [G06F 9/46](#)
- 2209/461 . . Bridge

2209/462	. . Lookup	2211/1004	. . . Adaptive RAID, i.e. RAID system adapts to changing circumstances, e.g. RAID1 becomes RAID5 as disks fill up
2209/463	. . Naming	2211/1007	. . . Addressing errors, i.e. silent errors in RAID, e.g. sector slipping and addressing errors
2209/48	. Indexing scheme relating to G06F 9/48	2211/1009	. . . Cache, i.e. caches used in RAID system with parity
2209/481	. . Exception handling	2211/1011	. . . Clustered RAID, i.e. clustered or de-clustered RAID where data and parity are spread over more disks than blocks in a parity group
2209/482	. . Application	2211/1014	. . . Compression, i.e. RAID systems with parity using compression techniques
2209/483	. . Multiproc	2211/1016	. . . Continuous RAID, i.e. RAID system that allows streaming or continuous media, e.g. VOD
2209/484	. . Precedence	2211/1019	. . . Fast writes, i.e. signaling the host that a write is done before data is written to disk
2209/485	. . Resource constraint	2211/1021	. . . Different size blocks, i.e. mapping of blocks of different size in RAID systems with parity
2209/486	. . Scheduler internals	2211/1023	. . . Different size disks, i.e. non uniform size of disks in RAID systems with parity
2209/50	. Indexing scheme relating to G06F 9/50	2211/1026	. . . Different size groups, i.e. non uniform size of groups in RAID systems with parity
2209/501	. . Performance criteria	2211/1028	. . . Distributed, i.e. distributed RAID systems with parity
2209/5011	. . Pool	2211/103	. . . Hybrid, i.e. RAID systems with parity comprising a mix of RAID types
2209/5012	. . Processor sets	2211/1033	. . . Inactive data in parity groups, i.e. RAID parity groups where parity is calculated on only occupied or busy bits in the stripe
2209/5013	. . Request control	2211/1035	. . . Keeping track, i.e. keeping track of data and parity changes
2209/5014	. . Reservation	2211/1038	. . . LFS, i.e. Log Structured File System used in RAID systems with parity
2209/5015	. . Service provider selection	2211/104	. . . Metadata, i.e. metadata associated with RAID systems with parity
2209/5016	. . Session	2211/1042	. . . NanoRAID, i.e. RAID systems using nanotechnology
2209/5017	. . Task decomposition	2211/1045	. . . Nested RAID, i.e. implementing a RAID scheme in another RAID scheme
2209/5018	. . Thread allocation	2211/1047	. . . No striping, i.e. parity calculation on a RAID involving no stripes, where a stripe is an independent set of data
2209/5019	. . Workload prediction	2211/105	. . . On the fly coding, e.g. using XOR accumulators
2209/502	. . Proximity	2211/1052	. . . RAID padding, i.e. completing a redundancy group with dummy data
2209/5021	. . Priority	2211/1054	. . . Parity-fast hardware, i.e. dedicated fast hardware for RAID systems with parity
2209/5022	. . Workload threshold	2211/1057	. . . Parity-multiple bits-RAID6, i.e. RAID 6 implementations
2209/503	. . Resource availability	2211/1059	. . . Parity-single bit-RAID5, i.e. RAID 5 implementations
2209/504	. . Resource capping	2211/1061	. . . Parity-single bit-RAID4, i.e. RAID 4 implementations
2209/505	. . Clust	2211/1064	. . . Parity-single bit-RAID3, i.e. RAID 3 implementations
2209/506	. . Constraint	2211/1066	. . . Parity-small-writes, i.e. improved small or partial write techniques in RAID systems
2209/507	. . Low-level	2211/1069	. . . Phantom write, i.e. write were nothing is actually written on the disk of a RAID system
2209/508	. . Monitor	2211/1071	. . . Power loss, i.e. interrupted writes due to power loss in a RAID system
2209/509	. . Offload		
2209/52	. Indexing scheme relating to G06F 9/52		
2209/521	. . Atomic		
2209/522	. . Manager		
2209/523	. . Mode		
2209/54	. Indexing scheme relating to G06F 9/54		
2209/541	. . Client-server		
2209/542	. . Intercept		
2209/543	. . Local		
2209/544	. . Remote		
2209/545	. . Gui		
2209/546	. . Xcast		
2209/547	. . Messaging middleware		
2209/548	. . Queue		
2209/549	. . Remote execution		
2211/00	Indexing scheme relating to details of data-processing equipment not covered by groups G06F 3/00 - G06F 13/00		
2211/001	. In-Line Device		
2211/002	. Bus		
2211/003	. Mutual Authentication Bi-Directional Authentication, Dialogue, Handshake		
2211/004	. Notarisation, Time-Stamp, Date-Stamp		
2211/005	. Network, LAN, Remote Access, Distributed System		
2211/006	. . E-Mail		
2211/007	. Encryption, En-/decode, En-/decipher, En-/decypher, Scramble, (De-)compress		
2211/008	. . Public Key, Asymmetric Key, Asymmetric Encryption		
2211/009	. Trust		
2211/10	. Indexing scheme relating to G06F 11/10		
2211/1002	. . Indexing scheme relating to G06F 11/1076		

2211/1073	. . . Problems due to wear-out failures in RAID systems	2212/2028	. . . Battery-backed RAM
2211/1076	. . . RAIP, i.e. RAID on platters	2212/205	. . Hybrid memory, e.g. using both volatile and non-volatile memory
2211/1078	. . . RAIR, i.e. RAID on removable media	2212/206	. . Memory mapped I/O
2211/108	. . . RAIT, i.e. RAID on tape drive	2212/21	. Employing a record carrier using a specific recording technology
2211/1083	. . . Reserve area on a disk of a RAID system	2212/211	. . Optical disk storage
2211/1085	. . . RMW, i.e. Read-Modify-Write method for RAID systems	2212/2112	. . . with a removable carrier, e.g. DVD
2211/1088	. . . Scrubbing in RAID systems with parity	2212/213	. . Tape storage
2211/109	. . . Sector level checksum or ECC, i.e. sector or stripe level checksum or ECC in addition to the RAID parity calculation	2212/214	. . Solid state disk
2211/1092	. . . Single disk raid, i.e. RAID with parity on a single disk	2212/2142	. . . using write-once memory, e.g. OTPROM
2211/1095	. . . Writes number reduction, i.e. reducing the number of writes in a RAID array with parity	2212/2146	. . . being detachable, e.g.. USB memory
2211/1097	. Boot, Start, Initialise, Power	2212/217	. . Hybrid disk, e.g. using both magnetic and solid state storage devices
2211/902	. Spectral purity improvement for digital function generators by adding a dither signal, e.g. noise	2212/22	. Employing cache memory using specific memory technology
2212/00	Indexing scheme relating to accessing, addressing or allocation within memory systems or architectures	2212/221	. . Static RAM
2212/10	. Providing a specific technical effect	2212/222	. . Non-volatile memory
2212/1004	. . Compatibility, e.g. with legacy hardware	2212/2228	. . . Battery-backed RAM
2212/1008	. . Correctness of operation, e.g. memory ordering	2212/224	. . Disk storage
2212/1012	. . Design facilitation	2212/225	. . Hybrid cache memory, e.g. having both volatile and non-volatile portions
2212/1016	. . Performance improvement	2212/25	. Using a specific main memory architecture
2212/1021	. . . Hit rate improvement	2212/251	. . Local memory within processor subsystem
2212/1024	. . . Latency reduction	2212/2515	. . . being configurable for different purposes, e.g. as cache or non-cache memory
2212/1028	. . Power efficiency	2212/253	. . Centralized memory
2212/1032	. . Reliability improvement, data loss prevention, degraded operation etc	2212/2532	. . . comprising a plurality of modules
2212/1036	. . . Life time enhancement	2212/254	. . Distributed memory
2212/1041	. . Resource optimization	2212/2542	. . . Non-uniform memory access [NUMA] architecture
2212/1044	. . . Space efficiency improvement	2212/26	. Using a specific storage system architecture
2212/1048	. . Scalability	2212/261	. . Storage comprising a plurality of storage devices
2212/1052	. . Security improvement	2212/262	. . . configured as RAID
2212/1056	. . Simplification	2212/263	. . Network storage, e.g. SAN or NAS
2212/15	. Use in a specific computing environment	2212/264	. . Remote server
2212/151	. . Emulated environment, e.g. virtual machine	2212/27	. Using a specific cache architecture
2212/152	. . Virtualized environment, e.g. logically partitioned system	2212/271	. . Non-uniform cache access [NUCA] architecture
2212/154	. . Networked environment	2212/272	. . Cache only memory architecture [COMA]
2212/16	. General purpose computing application	2212/28	. Using a specific disk cache architecture
2212/161	. . Portable computer, e.g. notebook	2212/281	. . Single cache
2212/163	. . Server or database system	2212/282	. . Partitioned cache
2212/165	. . Mainframe system	2212/283	. . Plural cache memories
2212/17	. Embedded application	2212/284	. . . being distributed
2212/171	. . Portable consumer electronics, e.g. mobile phone	2212/285	. . Redundant cache memory
2212/172	. . Non-portable consumer electronics	2212/286	. . . Mirrored cache memory
2212/1721	. . . Home entertainment system, e.g. television set	2212/30	. Providing cache or TLB in specific location of a processing system
2212/173	. . Vehicle or other transportation	2212/301	. . In special purpose processing node, e.g. vector processor
2212/174	. . Telecommunications system	2212/302	. . In image processor or graphics adapter
2212/175	. . Industrial control system	2212/303	. . In peripheral interface, e.g. I/O adapter or channel
2212/177	. . Smart card	2212/3035	. . In peripheral device, e.g. printer
2212/178	. . Electronic token or RFID	2212/304	. . In main memory subsystem
2212/20	. Employing a main memory using a specific memory technology	2212/3042	. . . being part of a memory device, e.g. cache DRAM
2212/202	. . Non-volatile memory	2212/305	. . being part of a memory device, e.g. cache DRAM
2212/2022	. . . Flash memory	2212/306	. . In system interconnect, e.g. between two buses
2212/2024	. . . Rewritable memory not requiring erasing, e.g. resistive or ferroelectric RAM	2212/31	. Providing disk cache in a specific location of a storage system
		2212/311	. . In host system
		2212/312	. . In storage controller

2212/313	. . In storage device	2212/68	. Details of translation look-aside buffer [TLB]
2212/314	. . In storage network, e.g. network attached cache	2212/681	. . Multi-level TLB, e.g. microTLB and main TLB
2212/40	. Specific encoding of data in memory or cache	2212/682	. . Multiprocessor TLB consistency
2212/401	. . Compressed data	2212/683	. . Invalidation
2212/402	. . Encrypted data	2212/684	. . TLB miss handling
2212/403	. . Error protection encoding, e.g. using parity or ECC codes	2212/70	. Details relating to dynamic memory management
2212/45	. Caching of specific data in cache memory	2212/702	. . Conservative garbage collection
2212/451	. . Stack data	2212/72	. Details relating to flash memory management
2212/452	. . Instruction code	2212/7201	. . Logical to physical mapping or translation of blocks or pages
2212/453	. . Microcode or microprogram	2212/7202	. . Allocation control and policies
2212/454	. . Vector or matrix data	2212/7203	. . Temporary buffering, e.g. using volatile buffer or dedicated buffer blocks
2212/455	. . Image or video data	2212/7204	. . Capacity control, e.g. partitioning, end-of-life degradation
2212/46	. Caching storage objects of specific type in disk cache	2212/7205	. . Cleaning, compaction, garbage collection, erase control
2212/461	. . Sector or disk block	2212/7206	. . Reconfiguration of flash memory system
2212/462	. . Track or segment	2212/7207	. . management of metadata or control data
2212/463	. . File	2212/7208	. . Multiple device management, e.g. distributing data over multiple flash devices
2212/464	. . Multimedia object, e.g. image, video	2212/7209	. . Validity control, e.g. using flags, time stamps or sequence numbers
2212/465	. . Structured object, e.g. database record	2212/7211	. . Wear leveling
2212/466	. . Metadata, control data		
2212/468	. . The specific object being partially cached		
2212/50	. Control mechanisms for virtual memory, cache or TLB		
2212/502	. . using adaptive policy		
2212/507	. . using speculative control		
2212/60	. Details of cache memory		
2212/601	. . Reconfiguration of cache memory		
2212/6012	. . . of operating mode, e.g. cache mode or local memory mode		
2212/602	. . Details relating to cache prefetching		
2212/6022	. . Using a prefetch buffer or dedicated prefetch cache		
2212/6024	. . History based prefetching		
2212/6026	. . Prefetching based on access pattern detection, e.g. stride based prefetch		
2212/6028	. . Prefetching based on hints or prefetch instructions		
2212/603	. . of operating mode, e.g. cache mode or local memory mode		
2212/6032	. . Way prediction in set-associative cache		
2212/604	. . Details relating to cache allocation		
2212/6042	. . Allocation of cache space to multiple users or processors		
2212/6046	. . . Using a specific cache allocation policy other than replacement policy		
2212/608	. . Details relating to cache mapping		
2212/6082	. . . Way prediction in set-associative cache		
2212/62	. Details of cache specific to multiprocessor cache arrangements		
2212/621	. . Coherency control relating to peripheral accessing, e.g. from DMA or I/O device		
2212/622	. . State-only directory, i.e. not recording identity of sharing or owning nodes		
2212/65	. Details of virtual memory and virtual address translation		
2212/651	. . Multi-level translation tables		
2212/652	. . Page size control		
2212/653	. . Page colouring		
2212/654	. . Look-ahead translation		
2212/655	. . Same page detection		
2212/656	. . Address space sharing		
2212/657	. . Virtual address space management		
		2213/00	Indexing scheme relating to interconnection of, or transfer of information or other signals between, memories, input/output devices or central processing units
		2213/0002	. Serial port, e.g. RS232C
		2213/0004	. Parallel ports, e.g. centronics
		2213/0006	. Extension to the industry standard architecture [EISA]
		2213/0008	. High speed serial bus, e.g. Fiber channel
		2213/0012	. High speed serial bus, e.g. IEEE P1394
		2213/0014	. Futurebus
		2213/0016	. Inter-integrated circuit (I2C)
		2213/0018	. Industry standard architecture [ISA]
		2213/0022	. Multibus
		2213/0024	. Peripheral component interconnect [PCI]
		2213/0026	. PCI express
		2213/0028	. Serial attached SCSI [SAS]
		2213/0032	. Serial ATA [SATA]
		2213/0034	. Sun microsystems bus [SBUS]
		2213/0036	. Small computer system interface [SCSI]
		2213/0038	. System on Chip
		2213/0042	. Universal serial bus [USB]
		2213/0044	. Versatile modular eurobus [VME]
		2213/0052	. Assignment of addresses or identifiers to the modules of a bus system
		2213/0054	. Split transaction bus
		2213/0056	. Use of address and non-data lines as data lines for specific data transfers to temporarily enlarge the data bus and increase information transfer rate
		2213/0058	. Bus-related hardware virtualisation
		2213/0062	. Bandwidth consumption reduction during transfers
		2213/0064	. Latency reduction in handling transfers
		2213/16	. Memory access
		2213/1602	. . Memory access type
		2213/24	. Interrupt
		2213/2402	. . Avoidance of interrupt starvation
		2213/2404	. . Generation of an interrupt or a group of interrupts after a predetermined number of interrupts

- 2213/2406 . . Generation of an interrupt or a group of interrupts after a fixed or calculated time elapses
- 2213/2408 . . Reducing the frequency of interrupts generated from peripheral to a CPU
- 2213/2412 . . Dispatching of interrupt load among interrupt handlers in processor system or interrupt controller
- 2213/2414 . . Routing of interrupt among interrupt handlers in processor system or interrupt controller
- 2213/2416 . . Determination of the interrupt source among a plurality of incoming interrupts
- 2213/2418 . . Signal interruptions by means of a message
- 2213/2422 . . Sharing of interrupt line among a plurality of interrupt sources
- 2213/2424 . . Interrupt packet, e.g. event
- 2213/28 . DMA
- 2213/2802 . . DMA using DMA transfer descriptors
- 2213/2804 . . Systems and methods for controlling the DMA frequency on an access bus
- 2213/2806 . . Space or buffer allocation for DMA transfers
- 2213/2808 . . Very long instruction word DMA
- 2213/36 . Arbitration
- 2213/3602 . . Coding information on a single line
- 2213/3604 . . Coding information on multiple lines
- 2213/38 . Universal adapter
- 2213/3802 . . Harddisk connected to a computer port
- 2213/3804 . . Memory card connected to a computer port directly or by means of a reader/writer
- 2213/3806 . . Mobile device
- 2213/3808 . . Network interface controller
- 2213/3812 . . USB port controller
- 2213/3814 . . Wireless link with a computer system port
- 2213/3852 . . Converter between protocols
- 2213/3854 . . Control is performed at the peripheral side
- 2213/40 . Bus coupling
- 2213/4002 . . Universal serial bus hub with a single upstream port
- 2213/4004 . . Universal serial bus hub with a plurality of upstream ports
- 2216/00 Indexing scheme relating to additional aspects of information retrieval not explicitly covered by [G06F 16/00](#) and subgroups**
- 2216/01 . Automatic library building
- 2216/03 . Data mining
- 2216/05 . Energy-efficient information retrieval
- 2216/07 . Guided tours
- 2216/09 . Obsolescence
- 2216/11 . Patent retrieval
- 2216/13 . Prefetching
- 2216/15 . Synchronised browsing
- 2216/17 . Web printing
- 2217/00 Indexing scheme relating to computer aided design [CAD]**
- 2217/02 . Component-based CAD
- 2217/04 . CAD in a network environment
- 2217/06 . Constraint-based CAD
- 2217/08 . Multi-objective optimization
- 2217/10 . Probabilistic or stochastic CAD
- 2217/12 . Design for manufacturability
- 2217/14 . Design for testability
- 2217/16 . Numerical modeling
- 2217/32 . Cloth
- 2217/34 . Pipes
- 2217/36 . Cables, cable trees, wire harnesses
- 2217/38 . Packaging
- 2217/40 . Chip packaging
- 2217/41 . Molding
- 2217/42 . Sheet material
- 2217/44 . Composites
- 2217/46 . Fuselage
- 2217/62 . Clock network
- 2217/64 . Structured ASICs
- 2217/66 . IP blocks
- 2217/68 . Processors
- 2217/70 . Fault tolerant, i.e. transient fault suppression
- 2217/72 . Spare resources, i.e. permanent fault suppression
- 2217/74 . Symbolic schematics
- 2217/76 . Ageing analysis and optimization
- 2217/78 . Power analysis and optimization
- 2217/80 . Thermal analysis and optimization
- 2217/82 . Noise analysis and optimization
- 2217/84 . Timing analysis and optimization
- 2217/86 . Hardware-Software co-design
- 2219/00 Indexing scheme relating to application aspects of data processing equipment or methods**
- 2219/10 . Environmental application, e.g. waste reduction, pollution control, compliance with environmental legislation
- 2221/00 Indexing scheme relating to security arrangements for protecting computers, components thereof, programs or data against unauthorised activity (not used)**
- 2221/03 . Indexing scheme relating to [G06F 21/50](#), monitoring users, programs or devices to maintain the integrity of platforms
- 2221/031 . . Protect user input by software means
- 2221/032 . . Protect output to user by software means
- 2221/033 . . Test or assess software
- 2221/034 . . Test or assess a computer or a system
- 2221/07 . Indexing scheme relating to [G06F 21/10](#), protecting distributed programs or content
- 2221/0702 . . Binding (not used)
- 2221/0704 . . . Device
- 2221/0706 Domain
- 2221/0708 . . . Location
- 2221/0711 . . . Token
- 2221/0713 . . . User
- 2221/0715 Characteristics
- 2221/0717 Domain
- 2221/072 Knowledge
- 2221/0722 . . Content (not used)
- 2221/0724 . . . Editing
- 2221/0726 . . . Personalisation (not used)
- 2221/0728 Conversion
- 2221/0731 On user or administrative requirements
- 2221/0733 Watermark
- 2221/0735 . . . Restriction at operating system level
- 2221/0737 . . . Traceability
- 2221/074 Tracing pattern recognition
- 2221/0742 . . . Enhanced product
- 2221/0744 . . . Unique instance ([G06F 2221/0702](#) takes precedence)

- 2221/0746 . . Emerging technologies
- 2221/0748 . . Hiding
- 2221/0751 . . Key (not used)
- 2221/0753 . . . Distribution
- 2221/0755 . . . Generation
- 2221/0757 . . Licence (not used)
- 2221/0759 . . . Conversion
- 2221/0762 . . . Definition (not used)
- 2221/0764 Grace period
- 2221/0766 Language
- 2221/0768 . . . Editing
- 2221/0771 . . . Revocation
- 2221/0773 . . . Recurrent authorisation
- 2221/0775 . . Logging
- 2221/0777 . . Return
- 2221/0779 . . Transfer (not used)
- 2221/0782 . . . Backup or restore
- 2221/0784 . . . Fragments
- 2221/0786 . . . Indirect via third party
- 2221/0788 . . . Peer-to-Peer [P2P]
- 2221/0791 . . . Superdistribution
- 2221/0793 . . . Synchronisation
- 2221/0795 . . . Transaction with ACID [Atomicity, Consistency, Isolation and Durability] properties
- 2221/0797 . . using dedicated hardware at the client
- 2221/21 . . Indexing scheme relating to [G06F 21/00](#) and subgroups addressing additional information or applications relating to security arrangements for protecting computers, components thereof, programs or data against unauthorised activity
- 2221/2101 . . Auditing as a secondary aspect
- 2221/2103 . . Challenge-response
- 2221/2105 . . Dual mode as a secondary aspect
- 2221/2107 . . File encryption
- 2221/2109 . . Game systems
- 2221/2111 . . Location-sensitive, e.g. geographical location, GPS
- 2221/2113 . . Multi-level security, e.g. mandatory access control
- 2221/2115 . . Third party
- 2221/2117 . . User registration
- 2221/2119 . . Authenticating web pages, e.g. with suspicious links
- 2221/2121 . . Chip on media, e.g. a disk or tape with a chip embedded in its case
- 2221/2123 . . Dummy operation
- 2221/2125 . . Just-in-time application of countermeasures, e.g., on-the-fly decryption, just-in-time obfuscation or de-obfuscation
- 2221/2127 . . Bluffing
- 2221/2129 . . Authenticate client device independently of the user
- 2221/2131 . . Lost password, e.g. recovery of lost or forgotten passwords
- 2221/2133 . . Verifying human interaction, e.g., Captcha
- 2221/2135 . . Metering
- 2221/2137 . . Time limited access, e.g. to a computer or data
- 2221/2139 . . Recurrent verification
- 2221/2141 . . Access rights, e.g. capability lists, access control lists, access tables, access matrices
- 2221/2143 . . Clearing memory, e.g. to prevent the data from being stolen
- 2221/2145 . . Inheriting rights or properties, e.g., propagation of permissions or restrictions within a hierarchy
- 2221/2147 . . Locking files
- 2221/2149 . . Restricted operating environment
- 2221/2151 . . Time stamp
- 2221/2153 . . Using hardware token as a secondary aspect