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
1. 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
2. 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.

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)

1/02 Digital function generators {(evaluating functions by calculating only G06F 7/544, G06F 7/60; generating sawtooth or staircase waveforms H03K 4/00)}

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)}

1/025 for functions having two-valued amplitude, e.g. Walsh functions (generation of pulse trains in general H03K 3/00)

1/0255 {Walsh or analogous functions}

1/03 working, at least partly, by table look-up (G06F 1/025 takes precedence)

NOTE
In order to be classified in this group, the table must contain function values of the desired or an intermediate function, not merely coefficients.

1/0307 {Logarithmic or exponential functions (G06F 1/0314, G06F 1/035 take precedence)}

1/0314 {the table being stored on a peripheral device, e.g. papertape, drum}

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)}

1/0328 . . . . [in which the phase increment is adjustable, e.g. by using an adder-accumulator]

1/0335 . . . . [the phase increment itself being a composed function of two or more variables, e.g. frequency and phase]

1/0342 . . . . [for generating simultaneously two or more related waveforms, e.g. with different phase angles only]

1/035 . . . . Reduction of table size (G06F 1/0314 takes precedence)

1/0353 . . . . [by using symmetrical properties of the function, e.g. using most significant bits for quadrant control]

1/0356 . . . . [by using two or more smaller tables, e.g. addressed by parts of the argument]

1/04 . . . . Generating or distributing clock signals or signals derived directly therefrom

1/06 . . . . Clock generators producing several clock signals (G06F 1/08 - G06F 1/14 take precedence)

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
I/1601 . . . (Construcional details related to the housing of computer displays, e.g. of CRT monitors, of flat displays (construcional details related to flat displays integrated in a portable computer, e.g. laptop, handheld computer G06F 1/1637; construcional details related to television receivers H04N 5/64))

I/1603 . . . . (Arrangements to protect the display from incident light, e.g. hoods)

I/1605 . . . . (Multimedia displays, e.g. with integrated or attached speakers, cameras, microphones)

I/1607 . . . . (Arrangements to support accessories mechanically attached to the display housing (G06F 1/1603, G06F 1/1605 take precedence))

I/1609 . . . . (to support filters or lenses)

I/1611 . . . . (to support document holders)

I/1613 . . . . (for portable computers (cooling arrangements therefor G06F 1/203; construcional details or arrangements for pocket calculators, electronic agendas or books G06F 15/0216; construcional details of portable telephone sets: with several bodies H04M 1/0202))

I/1615 . . . . (with several enclosures having relative motions, each enclosure supporting at least one I/O or computing function (construcional details of portable telephones comprising a plurality of mechanically joined movable body parts H04M 1/0206))

I/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)

I/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)

I/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)

I/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)

I/1624 . . . . (with sliding enclosures, e.g. sliding keyboard or display)

I/1626 . . . . (with a single-body enclosure integrating a flat display, e.g. Personal Digital Assistants [PDAs])

I/1628 . . . . (Carrying enclosures containing additional elements, e.g. case for a laptop and a printer)

I/163 . . . . (Wearable computers, e.g. on a belt)

I/1632 . . . . (External expansion units, e.g. docking stations)

I/1633 . . . . (Construcional details or arrangements of portable computers not specific to the type of enclosures covered by groups G06F 1/1615 - G06F 1/1626)

I/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 2/1023))

I/1637 . . . . (Details related to the display arrangement, including those related to the mounting of the display in the housing (construcional details related to the housing of computer displays in general G06F 1/1601))

I/1639 . . . . (the display being based on projection)

I/1641 . . . . (the display being formed by a plurality of foldable display components (G06F 1/1647 takes precedence))

I/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))

I/1645 . . . . (the display being suitable to be used in combination with an external overhead projector)

I/1647 . . . . (including at least an additional display (G06F 1/1692 takes precedence))

I/1649 . . . . (the additional display being independently orientable, e.g. for presenting information to a second user)

I/165 . . . . . (the additional display being small, e.g. for presenting status information)

I/1652 . . . . (the display being flexible, e.g. mimicking a sheet of paper, or rollable)

I/1654 . . . . (the display being detachable, e.g. for remote use)

I/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))

I/1658 . . . . (related to the mounting of internal components, e.g. disc drive or any other functional module)

I/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)

I/1662 . . . . (Details related to the integrated keyboard)

I/1664 . . . . (Arrangements for ergonomically adjusting the disposition of keys of the integrated keyboard)
G06F

1/166 . . . . . (Arrangements for reducing the size of the integrated keyboard for transport, e.g. foldable keyboards, keyboards with collapsible keys (G06F 1/1664 takes precedence))

1/167 . . . . . (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))

1/169 . . . . . (Detachable keyboards)

1/1671 . . . . . (Special purpose buttons or auxiliary keyboards, e.g. retractable mini keyboards, 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, H03B)

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 electromagnetical 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
Monitoring of events, devices or parameters that trigger a change in power modality

Monitoring remote activity, e.g. over telephone lines or network connections

Monitoring battery levels, e.g. power saving mode being initiated when battery voltage goes below a certain level

Monitoring of peripheral devices

of display devices

of disk drive devices

of memory devices

Monitoring task completion, e.g. by use of idle timers, stop commands or wait commands

Monitoring the presence, absence or movement of users

Power saving characterised by the action undertaken

by disabling clock generation or distribution

by lowering clock frequency

by software initiated power-off

by power saving in peripheral device

by power saving in bus

by power saving in optical drive

by power saving in cursor control device, e.g. mouse, joystick, trackball

by power saving in digitizer or tablet

by power saving in display device

by power saving in hard disk drive

by power saving in keyboard

by power saving in memory, e.g. RAM, cache

by power saving in modem or I/O interface

by power saving in PCMCIA card

by power saving in printer

by switching off individual functional units in the computer system

by task scheduling

by switching to a less power-consuming processor, e.g. sub-CPU

by lowering the supply or operating voltage

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

Specific input/output arrangements not covered by G06F 3/01 - G06F 3/16, e.g. facsimile, microfilm (facsimile per se H01N 1/00; viewers photographic printing G03B; electrography, magnetography G03G; other optical apparatus G02B 27/00)

Input arrangements through a video camera

Input/output arrangements for oriental characters

Input arrangements with force or tactile feedback as computer generated output to the user

Gesture based interaction, e.g. based on a set of recognized hand gestures (interaction based on gestures traced on a digitiser G06F 3/04883)

Input arrangements for oriental characters

Input arrangements based on nervous system activity detection, e.g. brain waves [EEG] detection, electromyograms [EMG] detection, electrodermal response detection

Input arrangements with force or tactile feedback as computer generated output to the user

Gesture based interaction, e.g. based on a set of recognized hand gestures (interaction based on gestures traced on a digitiser G06F 3/04883)

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Input arrangements with force or tactile feedback as computer generated output to the user

Gesture based interaction, e.g. based on a set of recognized hand gestures (interaction based on gestures traced on a digitiser G06F 3/04883)

Input arrangements for oriental characters

Arrangements for adjusting the tilt angle of a keyboard, e.g. pivoting legs (for keyboards integrated in a laptop computer G06F 1/16671)

Arrangements integrating additional peripherals in a keyboard, e.g. card or barcode reader, optical scanner

Arrangements providing an integrated pointing device in a keyboard, e.g. trackball, mini-joystick (for pointing devices integrated in a laptop computer G06F 1/1662; joysticks G05G 9/047; constructional details of pointing devices G06F 3/033)

Arrangements for ergonomically adjusting the disposition of keys of a keyboard (for keyboards integrated in a laptop computer G06F 1/16641)

Special purpose keyboards

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 1/16666)

Key guide holders

Cooperation and interconnection of the input arrangement with other functional units of a computer (G06F 3/023 - G06F 3/037 take precedence)
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.


3/0308 . . . [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 3/0354, 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 (digitisers characterised by the transducing means G06F 3/041)

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

WARNING

Group G06F 3/039 is impacted by reclassification into group G06F 3/0393.

Groups G06F 3/039 and G06F 3/0393 should be considered in order to perform a complete search.
{ Accessories for touch pads or touch screens, e.g. mechanical guides added to touch screens for drawing straight lines, hard keys overlaying touch screens or touch pads }

**WARNING**

Group G06F 3/0393 is incomplete pending reclassification of documents from group G06F 3/039.
Groups G06F 3/039 and G06F 3/0393 should be considered in order to perform a complete search.

{ Mouse pads }

**WARNING**

Group G06F 3/0416 is impacted by reclassification into groups G06F 3/04162, G06F 3/04164, G06F 3/04166, G06F 3/041661, and G06F 3/041662. All groups listed in this Warning should be considered in order to perform a complete search.

{ Digitisers, e.g. for touch screens or touch pads, characterised by the transducing means }

**WARNING**

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

{ using an array of force sensing means (position sensing using the local deformation of sensor cells G06F 3/0447) }

**WARNING**

Group G06F 3/04144 is incomplete pending reclassification of documents from group G06F 3/0414.
Groups G06F 3/0414 and G06F 3/04142 should be considered in order to perform a complete search.

{ Details of scanning methods, e.g. sampling time, grouping of sub areas or time sharing with display driving (Synchronisation with the driving of the display or the backlighting unit to avoid interferences generated internally G06F 3/04184) }

**WARNING**

Group G06F 3/04166 is incomplete pending reclassification of documents from group G06F 3/0416.
Groups G06F 3/0416 and G06F 3/04164 should be considered in order to perform a complete search.
[using detection at multiple resolutions, e.g. coarse and fine scanning; using detection within a limited area, e.g. object tracking window]

**WARNING**

Group G06F 3/041661 is incomplete pending reclassification of documents from group G06F 3/0416. Groups G06F 3/0416 and G06F 3/041661 should be considered in order to perform a complete search.

[using alternate mutual and self-capacitive scanning]

**WARNING**

Group G06F 3/041662 is incomplete pending reclassification of documents from group G06F 3/0416. Groups G06F 3/0416 and G06F 3/041662 should be considered in order to perform a complete search.

{ for error correction or compensation, e.g. based on parallax, calibration or alignment}

**WARNING**


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

{Filtering of noise external to the device and not generated by digitiser components}

**WARNING**

Group G06F 3/04182 is incomplete pending reclassification of documents from group G06F 3/0418. Groups G06F 3/0418 and G06F 3/04182 should be considered in order to perform a complete search.

{Synchronisation with the driving of the display or the backlighting unit to avoid interferences generated internally}

**WARNING**

Group G06F 3/04184 is incomplete pending reclassification of documents from group G06F 3/0418. Groups G06F 3/0418 and G06F 3/04184 should be considered in order to perform a complete search.

{Touch location disambiguation}

**WARNING**

Group G06F 3/04186 is incomplete pending reclassification of documents from group G06F 3/0418. Groups G06F 3/0418 and G06F 3/04186 should be considered in order to perform a complete search.

by opto-electronic means

{by interrupting or reflecting a light beam, e.g. optical touch-screen}

{using sweeping light beams, e.g. using rotating or vibrating mirror}

{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)}

{tracking fingers with respect to a virtual keyboard projected or printed on the surface (virtual keyboards on touch screens G06F 3/0486)}

{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)}

{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}

{in which generating transducers and detecting transducers are attached to a single acoustic waves transmission substrate}

by capacitive means

**WARNING**


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

{using active external devices, e.g. active pens, for receiving changes in electrical potential transmitted by the digitiser, e.g. tablet driving signals}
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 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 . . . . . . . {using 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

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.

3/04817 . . . . . {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}

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]
technique } specifically adapted to use a particular
Connection management } levels }

maintenance, e.g. device status, power 
Printer resources management or printer 
Client or server resources management 
[Software update, e.g. print driver, 
modules, plug-ins, fonts ]

Discovery of devices having required 
properties }

[Printer definition files ]

[Printing driverless or using generic 
drivers ]

Printer resources management or printer 
maintenance, e.g. device status, power 
levels ]

[Software or firmware update, e.g. device 
firmware management ]

(Device related settings, e.g. IP address, 
Name, Identification )

[Transmitting printer device capabilities, 
e.g. upon request or periodically ]

[Errors handling and recovery, 
e.g. reprinting ( G06F 3/1261 takes 
precedence )]

{caused by end of consumables, e.g. 
paper, ink, toner ]

{Connection management ]

[Print job management ]

{Secure printing, e.g. user identification, 
user rights for device usage, unallowed 
content, blanking portions or fields of a 
page, releasing held jobs ]

{Restricting the usage of resources, 
e.g. usage or user levels, credit limit, 
consumables, special fonts ]

Parallel printing or parallel ripping ]

{Dividing a job according to job 
requirements, e.g. black/white and colour 
pages, covers and body of books, tabs ]

{Image or content composition onto a 
page ]

{Variable data printing, e.g. document 
forms, templates, labels, coupons, 
advertisements, logos, watermarks, 
transactional printing, fixed content 
versioning ]

Job translation or job parsing, e.g. page 
banding ]

(by conversion to intermediate or 
common format ]

(by handling markup languages, e.g. 
XSL, XML, HTML ]

(by conversion to printer ready format ]

(by printer language recognition, e.g. 
PDL, PCL, PDF ]

[Page layout or assigning input pages onto 
output media, e.g. imposition ]

{for continuous media, e.g. web media, 
rolls ]

Configuration of print job parameters, 
e.g. using UI at the client ]

{Automatic configuration, e.g. by 
driver ]

{Settings incompatibility, e.g. 
constraints, user requirements vs. device 
capabilities ]

{User feedback, e.g. print preview, test 
print, proofing, pre-flight checks ]

(by using pre-stored settings, e.g. job 
templates, presets, print styles )

(by updating job settings at the printer ]

[Print job monitoring, e.g. job status ]

Job scheduling, e.g. queuing, determine 
appropriate device ]

(by using alternate printing ]

(by grouping or ganging jobs ]

(based on job priority, e.g. re-arranging 
the order of jobs, e.g. the printing 
sequence ]

(by assigning post-processing 
resources ]

{Printing by reference, e.g. retrieving 
document/image data for a job from a 
source mentioned in the job ]

{Job repository, e.g. non-scheduled jobs, 
delay printing ]

{Job submission, e.g. submitting print job 
order or request not the print data itself ]

(by broadcasting server ]

(by using hot folders, e.g. folder 
for which print settings or print data 
management rules are set in advance ]

{Job submission at the printing node, 
e.g. creating a job from a data stored 
locally or remotely ( G06F 3/1238 takes 
precedence )

(by digital store front, e.g. e-ordering, 
web2print, submitting a job from a 
remote submission screen ]

(by print job history, e.g. logging, 
accounting, tracking ]

(by deleting of print job ]

(by print workflow management, e.g. defining 
or changing a workflow, cross publishing ]

(by within a printer driver, e.g. driver resides 
either on a server or on a client ]

(by using filter pipeline, e.g. outside the 
job source mentioned in the job ]

(by using alternate printing ]

(by securely or changing a workflow, cross 
publishing ]

(by using alternate printing ]

(by within a printer driver, e.g. driver resides 
either on a server or on a client ]
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- and 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 takes precedence; information retrieval G06F 16/00; comparing pulses H03K 5/22)]

7/023 [adaptive, e.g. self learning]
Computations with decimal numbers { radix 10 takes precedence }  { ( G06F 7/4806, G06F 7/4824, G06F 7/491, G06F 7/544 takes precedence ) }  

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 7/491, G06F 7/544 takes precedence ) }  

Computations with rational numbers  

Computations with complex numbers  

Multiplying; Dividing { ( G06F 7/4833, G06F 7/4836 takes precedence ) }  

Computations with complex numbers  

Complex multiplication  

Multiplying; Dividing { ( G06F 7/492, G06F 7/498 takes precedence ) }  

Computations with complex numbers  

Complex multiplication  

Making, e.g. combining data contained in ordered sequence on one or more record 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 )  

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  

Methods or arrangements for performing computations using exclusively denominational number representation, e.g. using binary, ternary, decimal representation  

[using cryogenic components, e.g. Josephson gates]  

[using magnetic or similar elements (parametric and other resonant circuits G06F 7/388)]  

[decimal, radix 20 or 12 ( G06F 7/385 takes precedence )]  

[using other various devices such as electrochemical, microwave, surface acoustic wave, neutron, electron beam switching, resonant, e.g. parametric, ferro-resonant]  

[using contact-making devices, e.g. electromagnetic relay ( G06F 7/46 takes precedence )]  

[binary]  

Computations with complex numbers  

Multiplying; Dividing { ( G06F 7/492, G06F 7/498 takes precedence ) }  

Computations with complex numbers  

Complex multiplication  

Multiplying; Dividing { ( G06F 7/492, G06F 7/498 takes precedence ) }  

Computations with complex numbers  

Complex multiplication  

Making, i.e. combining two or more sets of record carriers in ordered sequence G06F 7/16)  

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  

with provision for printing-out a list of selected items  

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  

Combined merging and sorting  

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  

Arrangements for sorting or merging computer data on continuous record carriers, e.g. tape, drum, disc  

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 )  

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  

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 )  

Combined merging and sorting  

Methods or arrangements for performing computations using exclusively denominational number representation, e.g. using binary, ternary, decimal representation  

[using cryogenic components, e.g. Josephson gates]  

[using magnetic or similar elements (parametric and other resonant circuits G06F 7/388)]  

[decimal, radix 20 or 12 ( G06F 7/385 takes precedence )]  

[using other various devices such as electrochemical, microwave, surface acoustic wave, neutron, electron beam switching, resonant, e.g. parametric, ferro-resonant]  

[using contact-making devices, e.g. electromagnetic relay ( G06F 7/46 takes precedence )]  

[binary]  

Adding; Subtracting { ( G06F 7/405 takes precedence ) }  

Multiplying; Dividing { ( G06F 7/405 takes precedence ) }  

[by successive additions or subtractions]  

[by partial product forming (with electric multiplication table)]  

using electromechanical counter-type accumulators  

[Adding; subtracting]  

[Multiplying; dividing]  

[by successive additions or subtractions]  

[by partial product forming (with electric multiplication table)]  

[by successive multiplication or division by 2]  

[by using preset multiples of the multiplicand or the divisor]  

[for evaluating functions by calculation]  

using non-contact-making devices, e.g. tube, solid state device; using unspecified devices  

[Computations with complex numbers]  

[Complex multiplication]  

[using coordinate rotation digital computer [CORDIC]]  

[using signed-digit representation]  

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 7/491, G06F 7/544 takes precedence ) }  

[Logarithmic number system]  

[Computations with rational numbers]  

Adding; Subtracting { ( G06F 7/4833, G06F 7/4836 takes precedence ) }  

Adding; Subtracting { ( G06F 7/493 takes precedence ) }  

Adding; Subtracting { ( G06F 7/493 takes precedence ) }  

Adding; Subtracting { ( G06F 7/493 takes precedence ) }  

Adding; Subtracting { ( G06F 7/493 takes precedence ) }  

Adding; Subtracting { ( G06F 7/493 takes precedence ) }  

the representation being the natural binary coded representation, i.e. 8421-code  

Adding; Subtracting  

in digit-serial fashion, i.e. having a single digit-handling circuit treating all denominations after each other
G06F

7/496 . . . . Multiplying; Dividing
7/498 . . . . using counter-type accumulators
7/4981 . . . . [Adding; Subtracting]
7/4983 . . . . [Multiplying; Dividing]
7/4985 . . . . [by successive additions or subtractions]
7/4986 . . . . [by successive multiplication or division by 2]
7/4988 . . . . [by table look-up]
7/499 . . Denomination or exception handling, e.g. rounding, overflow

**NOTE**

- 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 ICs G06F 7/499 +

7/49905 . . . . [Exception handling]
7/4991 . . . . [Overflow or underflow]
7/49915 . . . . [Mantissa overflow or underflow in handling floating-point numbers]
7/49921 . . . . [Saturation, i.e. clipping the result to a minimum or maximum value]
7/49926 . . . . [Division by zero]
7/49931 . . . . [Modulo N reduction of final result]
7/49936 . . . . [Normalisation mentioned as feature only]
7/49942 . . . . [Significance control]
7/49947 . . . . [Rounding]
7/49952 . . . . [Sticky bit]
7/49957 . . . . [Implementation of IEEE-754 Standard]
7/49963 . . . . [Rounding to nearest (G06F 7/49957 takes precedence)]
7/49968 . . . . [Rounding towards positive infinity (G06F 7/49957 takes precedence)]
7/49973 . . . . [Rounding towards negative infinity, e.g. truncation of two's complement numbers (G06F 7/49957 takes precedence)]
7/49978 . . . . [Rounding towards zero (G06F 7/49957 takes precedence)]
7/49984 . . . . [Rounding away from zero]
7/49989 . . . . [Interval arithmetic]
7/49994 . . . . [Sign extension]
7/50 . . . . Adding; Subtracting (G06F 7/498 - G06F 7/491, G06F 7/544 take precedence)
7/501 . . . . Half or full adders, i.e. basic adder cells for one denomination (EXCLUSIVE-OR circuits H03K 19/21)
7/5013 . . . . [using algebraic addition of the input signals, e.g. Kirschhoff adders]
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]
7/502 . . . . Half adders; Full adders consisting of two cascaded half adders (G06F 7/5013 takes precedence)
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

7/504 . . . . in bit-serial fashion, i.e. having a single digit-handling circuit treating all denominations after each other
7/5045 . . . . [for multiple operands]
7/505 . . . . in bit-parallel fashion, i.e. having a different digit-handling circuit for each denomination (half or full adders G06F 7/501)
7/5052 . . . . [using carry completion detection, either over all stages or at sample stages only]
7/5055 . . . . [in which one operand is a constant, i.e. incrementers or decrementers]
7/5057 . . . . [using table look-up]; using programmable table look-up 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 Sweeney-Robertson-Tocher [SRT] algorithm
7/5375 . . . . . . . [Non restoring calculation, where each digit is either negative, zero or positive, e.g. SRT;]
7/544 . . . . for evaluating functions by calculation
7/5443 . . . . . (Sum of products (for applications thereof, see the relevant places, e.g. G06F 17/10, H03H 12/00))
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, LIPO 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]

8/443 . . . . . . [Optimisation]

8/4432 . . . . . . [Reducing the energy consumption]

8/4434 . . . . . . [Reducing the memory space required by the program code]

8/4435 . . . . . . [Detection or removal of dead or redundant code]

8/4436 . . . . . . [Exlining; Procedural abstraction]

8/4441 . . . . . . [Reducing the execution time required by the program code]

8/4442 . . . . . . [Reducing the number of cache misses; Data prefetching (cache prefetching G06F 12/0862)]

8/4443 . . . . . . [Inlining]

8/445 . . . . . . [Exploiting fine grain parallelism, i.e. parallelism at instruction level (run-time instruction scheduling G06F 9/3836)]

8/4451 . . . . . . [Avoiding pipeline stalls]

8/4452 . . . . . . [Software pipelining]

8/447 . . . . . . [Target code generation]

8/45 . . . . . . [Exploiting coarse grain parallelism in compilation, i.e. parallelism between groups of instructions]

8/451 . . . . . . [Code distribution (considering CPU load at run-time G06F 9/505; load rebalancing G06F 9/5083)]

8/452 . . . . . . [Loops]

8/453 . . . . . . [Data distribution]

8/454 . . . . . . [Consistency (cache consistency protocols in hierarchically structured memory systems G06F 12/0815)]

8/456 . . . . . . [Parallelism detection]

8/457 . . . . . . [Communication (intertask communication G06F 9/54)]

8/458 . . . . . . [Synchronisation, e.g. post-wait, barriers, locks (synchronisation among tasks G06F 9/52)]

8/47 . . . . . . [Retargetable compilers]

8/48 . . . . . . [Incremental compilation (software reuse G06F 8/36)]

8/49 . . . . . . [Partial evaluation]

8/51 . . . . . . [Source to source]

8/52 . . . . . . [Binary to binary]

8/53 . . . . . . [Decomposition; Disassembly]

8/54 . . . . . . [Link editing before load time]

8/60 . . . . . . [Software deployment]

8/61 . . . . . . [Installation]

8/62 . . . . . . [Uninstallation]

8/63 . . . . . . [Image based installation; Cloning; Build to order]

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.
8/654 . . . using techniques specially adapted for alterable solid state memories, e.g. for EEPROM or flash memories
8/656 . . . while running
8/658 . . . Incremental updates; Differential updates
8/66 . . . [program code stored in read-only memory
8/70 . . . Software maintenance or management
8/71 . . . Version control (security arrangements therefor G06F 21/57); Configuration management

**WARNING**

Group G06F 8/71 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.

8/72 . . . Code refactoring
8/73 . . . Program documentation
8/74 . . . Reverse engineering; Extracting design information from source code
8/75 . . . Structural analysis for program understanding
8/751 . . . [Code clone detection]
8/76 . . . Adapting program code to run in a different environment; Porting
8/77 . . . Software metrics
8/78 . . . [Methods to solve the "Year 2000" [Y2K] problem]

**9/00** **Arrangements for program control, e.g. control units** (program control for peripheral devices G06F 13/10)
9/02 . . . using wired connections, e.g. plugboards
9/04 . . . using record carriers containing only program instructions (G06F 9/06 takes precedence)
9/06 . . . using stored programs, i.e. using an internal store of processing equipment to receive or retain programs
9/22 . . . Microcontrol or microprogram arrangements
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]
9/226 . . . [Microinstruction function, e.g. input/output microinstruction; diagnostic microinstruction; microinstruction format]
9/24 . . . Loading of the microprogram
9/26 . . . Address formation of the next micro-instruction (G06F 9/28 takes precedence) [Microprogram storage or retrieval arrangements]
9/261 . . . [Microinstruction address formation]
9/262 . . . [Arrangements for next microinstruction selection]
9/264 . . . [Microinstruction selection based on results of processing]
9/265 . . . [by address selection on input of storage]
9/267 . . . [by instruction selection on output of storage]
9/268 . . . [Microinstruction selection not based on processing results, e.g. interrupt, patch, first cycle store, diagnostic programs]

9/28 . . . Enhancement of operational speed, e.g. by using several microcontrol devices operating in parallel
9/30 . . . Arrangements for executing machine instructions, e.g. instruction decode (for executing microinstructions G06F 9/22)
9/3003 . . . [Arrangements for executing specific machine instructions]
9/3007 . . . [to perform operations on data operands]
9/3001 . . . [Arithmetic instructions]
9/3014 . . . . . . . . . . [with variable precision]
9/30018 . . . [Bit or string instructions; instructions using a mask]
9/30021 . . . [Compare instructions, e.g. Greater-Than, Equal-To, MINMAX]
9/30025 . . . . . . . . . . . . . . [Floating-Point conversion instructions, e.g. Floating-Point to Integer, decimal conversion]
9/30029 . . . [Logical and Boolean instructions, e.g. XOR, NOT]
9/30032 . . . [Movement instructions, e.g. MOVE, SHIFT, ROTATE, SHUFFLE]
9/30036 . . . [Instructions to perform operations on packed data, e.g. vector operations]
9/3004 . . . [to perform operations on memory]
9/30043 . . . [LOAD or STORE instructions; Clear instruction]
9/30047 . . . [Prefetch instructions; cache control instructions]
9/3005 . . . [to perform operations for flow control]
9/30054 . . . [Unconditional branch instructions]
9/30058 . . . [Conditional branch instructions]
9/30061 . . . . . . . . . . [Multi-way branch instructions, e.g. CASE]
9/30065 . . . . . . . . . . [Loop control instructions; iterative instructions, e.g. LOOP, REPEAT]
9/30069 . . . [Instruction skipping instructions, e.g. SKIP]
9/30072 . . . [to perform conditional operations, e.g. using guard]
9/30076 . . . [to perform miscellaneous operations, e.g. using guard]
9/30079 . . . [Pipeline control instructions]
9/30083 . . . [Power or thermal control instructions]
9/30087 . . . [Synchronisation or serialisation instructions]
9/3009 . . . [Thread control instructions]
9/30094 . . . [Condition code generation, e.g. Carry, Zero flag]
9/30098 . . . [Register arrangements]
9/30101 . . . [Special purpose registers]
9/30105 . . . [Register structure]
9/30109 . . . [having multiple operands in a single register]
9/30112 . . . [for variable length data, e.g. single or double registers]
9/30116 . . . [Shadow registers, e.g. coupled registers, not forming part of the register space]
9/3012 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . [Organisation of register space, e.g. banked or distributed register file]
9/30123 . . . [according to context, e.g. thread buffers]
9/30127 . . . [Register windows]
Concurrent instruction execution, e.g. pipeline, takes precedence

Indexed addressing, i.e. using more than one address operand

Indirect addressing, i.e. using single address operand, e.g. address register

Addressing or accessing the instruction set, e.g. Java byte, legacy code

Instruction analysis, e.g. decoding, instruction formation

Instruction prefetching

Operand accessing

Decoding for concurrent execution

Pipelined decoding, e.g. using predecoding

Parallel decoding, e.g. parallel decode units

Operand accessing

Data result bypassing, e.g. locally between pipeline stages, within a pipeline stage

with global bypass, e.g. between pipelines, between clusters

Operand prefetching (cache prefetching)

Value prediction for operands; operand history buffers

Maintaining memory consistency (cache consistency protocols)

Instruction issuing, e.g. dynamic instruction scheduling, out of order instruction execution

Dependency mechanisms, e.g. register scoreboarding

Register renaming

Speculative instruction execution

using dynamic prediction, e.g. branch history table

using static prediction, e.g. branch taken strategy

using hybrid branch prediction, e.g. selection between prediction techniques

from multiple instruction streams, e.g. multistreaming (initiation or dispatching of multiple tasks or threads)

of compound instructions

Reordering, e.g. using a queue, age tags

Result writeback, i.e. updating the architectural state

with result invalidation, e.g. nullification

Recovery, e.g. branch miss-prediction, exception handling

using multiple copies of the architectural state, e.g. shadow registers

using deferred exception handling, e.g. exception flags

using instruction pipelines

Implementation aspects, e.g. pipeline latches; pipeline synchronisation and clocking

Address formation of the next instruction, e.g. by incrementing the instruction counter (G06F 9/38 takes precedence)

Program or instruction counter, e.g. incrementing

for non-sequential address

using program counter relative addressing

for loops, e.g. loop detection, loop counter

for interrupts

for runtime instruction patching

Addressing or accessing the instruction operand or the result;
Formation of operand address; Addressing modes (address translation)

Extension of operand address space

of multiple operands or results

using stride

Indirect addressing, i.e. using single address operand, e.g. address register

Indexed addressing, i.e. using more than one address operand

using wraparound, e.g. modulo or circular addressing

using scaling, e.g. multiplication of index

using program counter as base address

Concurrent instruction execution, e.g. pipeline, look ahead

Instruction prefetching

for branches, e.g. hedging, branch folding

using address prediction, e.g. return stack, branch history buffer

for instruction reuse, e.g. trace cache, branch target cache

Loop buffering

with instruction modification, e.g. store into instruction stream

Implementation provisions of instruction buffers, e.g. prefetch buffer; banks

Instruction alignment, e.g. cache line crossing

Decoding for concurrent execution

Pipelined decoding, e.g. using predecoding

Parallel decoding, e.g. parallel decode units

Operand accessing

Data result bypassing, e.g. locally between pipeline stages, within a pipeline stage

with global bypass, e.g. between pipelines, between clusters

Operand prefetching (cache prefetching)

Value prediction for operands; operand history buffers

Maintaining memory consistency (cache consistency protocols)

Instruction issuing, e.g. dynamic instruction scheduling, out of order instruction execution

Dependency mechanisms, e.g. register scoreboarding

Register renaming

Speculative instruction execution

using dynamic prediction, e.g. branch history table

using static prediction, e.g. branch taken strategy

using hybrid branch prediction, e.g. selection between prediction techniques

from multiple instruction streams, e.g. multistreaming (initiation or dispatching of multiple tasks or threads)

of compound instructions

Reordering, e.g. using a queue, age tags

Result writeback, i.e. updating the architectural state

with result invalidation, e.g. nullification

Recovery, e.g. branch miss-prediction, exception handling

using multiple copies of the architectural state, e.g. shadow registers

using deferred exception handling, e.g. exception flags

using instruction pipelines

Implementation aspects, e.g. pipeline latches; pipeline synchronisation and clocking
WARNING

Group G06F 9/445 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.

9/44526 . . . . . . . . . [Plug-ins; Add-ons]
9/44536 . . . . . . . . . [Selecting among different versions]
9/44542 . . . . . . . . . [Retargetable]
9/44544 . . . . . . . . . [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-Windowsystem, 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
9/4504 . . . . . . . . . . . . [Abstract machines for programme code execution, e.g. Java virtual machine [JVM], interpreters, emulators]
9/4508 . . . . . . . . . . . . [Runtime interpretation or emulation, e.g. emulator loops, bytecode interpretation]
9/4512 . . . . . . . . . . . . [Command shells]
9/4516 . . . . . . . . . . . . . Runtime code conversion or optimisation
9/452 . . . . . . . . . . . . . [Involving translation to a different instruction set architecture, e.g. just-in-time translation in a JVM]
9/4525 . . . . . . . . . . . . [Optimisation or modification within the same instruction set architecture, e.g. HP Dynamo]
9/4529 . . . . . . . . . . . . [Embedded in an application, e.g. JavaScript in a Web browser]
9/4533 . . . . . . . . . . . . [Virtual machines; 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}
9/45544 . . . . . . {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}
2009/45575 . . . . . . {Starting, stopping, suspending or resuming virtual machine instances}
2009/45579 . . . . . . {I/O management, e.g. providing access to device drivers or storage}
2009/45583 . . . . . . {Memory management, e.g. access or allocation}
2009/45587 . . . . . . {Isolation or security of virtual machine instances}
2009/45591 . . . . . . {Monitoring or debugging support}
2009/45595 . . . . . . {Network integration; Enabling network access in virtual machine instances}
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 . . . . . . {Transaction 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}
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 and subgroups according to the features used for protecting

11/00

[User-generated data transfer, e.g. clipboards, dynamic data exchange [DDE], object linking and embedding [OLE]]

11/001

[Buffers; Shared memory; Pipes]

11/003

[where tasks reside in different layers, e.g. user- and kernel-space]

11/004

[Message passing systems or structures, e.g. queues]

11/005

[Remote procedure calls [RPC]; Web services]

11/006

(Object oriented; Remote method invocation [RMI] (non-remote method invocation G06F 9/449))

11/072

[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 29/085-39)]

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 13/30; 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]

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)]
Error detection or correction of the data by redundancy in operation \(\text{(G06F 11/16 takes precedence)}\)

- Remedial or corrective actions (by retry) \(\text{(G06F 11/1402)}\)
- Recovery from an exception in an instruction pipeline \(\text{(G06F 9/3861)}\)
- in a network context \(\text{(H04L 29/13)}\)

- Safety measures, i.e. ensuring safe condition in the event of error, e.g. for controlling element

- Error detection or correction by redundancy in data representation, e.g. by using checking codes

- {out-of-m codes}

- {inherent redundancy, e.g. n-

- {using codes with inherent redundancy, e.g. n-

- {using codes or arrangements adapted for a specific type of error \(\text{(G06F 11/1048 takes precedence)}\)

- Using a processing unit with dedicated error detection or correction feature \(\text{(G06F 11/1052)}\)

- Bypassing or disabling error detection or correction

- Updating check bits on partial write, i.e. read/modify/write

- Correcting systematically all correctable errors, i.e. scrubbing

- [in cache or content addressable memories]

- [in sector programmable memories, e.g. flash disk \(\text{(G06F 11/1072 takes precedence)}\)]

- [in multilevel memories]

- Parity data used in redundant arrays of independent storages, e.g. in RAID systems

- Parity data distribution in semiconductor storages, e.g. in SSD

- Degraded mode, e.g. caused by single or multiple storage removals or disk failures

- Reconstruction on already foreseen single or plurality of spare disks

- Rebuilding, e.g. when physically replacing a failing disk

- Parity calculation or recalculation after configuration or reconfiguration of the system
output of redundant processing systems with circuits \( \{ \) error detection by comparing the output of redundant components \( \} \) using passive fault-masking of the redundant components which are operating with time diversity synchronisation of redundant processing components \( \{ \) temporal synchronisation or re-synchronization of a redundant processing component, or initial sync of replacement, additional or spare unit \( \} \)Error detection by comparing the memory parity RAID storage \( \{ \) using mutual exchange of the output of redundant processing components \( \} \) using additional compare functionality in one or some but not all of the redundant processing components \( \{ \) where the comparison is not performed by the redundant processing components \( \} \) \{ and the comparison itself uses redundant hardware \} \{ with continued operation after detection of the error \} \{ with the output of only one of the redundant processing components can drive the attached hardware, e.g. memory or I/O \} \{ Data re-synchronization of a redundant component, or initial sync of replacement, additional or spare unit \} \{ the resynchronized component or unit being a persistent storage device (re-synchronization of failed mirror storage \( \{ \) rebuild or reconstruction of parity RAID storage \( \{ \) where the redundant component is memory or memory area \( \} \) Temporal synchronisation or re-synchronization of redundant processing components \( \{ \) at clock signal level \( \} \) \{ at instruction level \} \{ at event level, e.g. by interrupt or result of polling \} \{ using a quantum \} \{ which are operating with time diversity \} \{ 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 \( \)} \{ Eliminating the failing redundant component \} \{ based on mutual exchange of the output between redundant processing components \} \{ by voting, the voting not being performed by the redundant components \} \{ where the redundant components implement processing functionality \} \{ and the voting is itself performed redundantly \} \{ Passive fault masking when reading multiple copies of the same data \} \{ Voting techniques \} \{ where exact match is not required \} \{ using active fault-masking, e.g. by switching out faulty elements or by switching in spare elements \} \{ where interconnections or communication control functionality are redundant (flexible arrangements for bus networks involving redundancy \( \{ \) power supply failure \( \} \) \{ Redundant power supplies (power supply failure \( \{ \) redundant communication control functionality \( \{ \) redundant communication control functionality \( \{ \) redundant communication control functionality \( \} \) \{ Redundant power supplies (power supply failure \( \{ \) using redundant communication controllers \} \{ using redundant communication media \} \{ between storage system components \} \{ using different communication protocols \} \{ Failover techniques \} \{ using centralised failover control functionality \} \{ eliminating a faulty processor or activating a spare \} \{ using migration \} \{ switching over of hardware resources \} \{ without idle spare hardware \} \{ with a single idle spare processing component \} \{ with more than one idle spare processing component \} \{ with the redundant components share a common memory address space \} \{ where the redundant components share persistent storage \( \{ \) takes precedence \( \} \} \{ where the redundant components share neither address space nor persistent storage \} \{ in regular structures \} \{ 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 \( \} \) by mirroring \} \{ using more than 2 mirrored copies \} \{ combined with de-clustering of data \} \{ 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 stand-by 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]
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
by tracing or monitoring G06F 11/3466

interface G06F 11/3656

using additional hardware

using a specific debug

means or processing

involved in sensing the

G06F 11/0766

monitored data ( error or fault reporting or logging

means or processing involved in reporting the

G06F 11/16

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)

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)

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)

where the monitored property is the power

consumption (power management in a

computing system G06F1/3203)

Monitoring arrangements determined by the

means or processing involved in reporting the

monitored data (error or fault reporting or logging

G06F 11/0766)

where the reporting involves data format

conversion

where the reporting involves data filtering, e.g. pattern matching, time or event triggered,
adaptive or policy-based reporting

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

the data filtering being achieved by

reporting only the changes of the monitored
data

the data filtering being achieved by

aggregating or compressing the monitored
data

where the reporting involves the use of self

describing data formats, i.e. metadata, markup
languages, human readable formats

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)

Configuration details thereof, e.g. installation,

enabling, spatial arrangement of the probes

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:

snifing, intercepting, indirectly deriving the

monitored data from other directly available
data

with visual (or acoustical) indication of the

functioning of the machine

Display for diagnostics, e.g. diagnostic result
display, self-test user interface

Display of waveforms, e.g. of logic

 analysers (G06F 11/322 takes precedence)

Visualisation of programs or trace data

Display of status information

by lamps or LED's

for error or online/offline status

Alarm or error message display

Computer systems status display

(G06F 11/327 takes precedence)

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)

for parallel or distributed programming

for performance assessment

Workload generation, e.g. scripts, playback

by assessing time

where the assessed time is active or idle
time

Benchmarking

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)

monitoring of user actions (checking the
network activity of the user for network-
specific applications H04L 67/722)

for planning or managing the needed
capacity

Performance evaluation by modeling

Performance evaluation by statistical
analysis

Performance evaluation by simulation

Trace driven simulation

Performance evaluation by tracing or
monitoring

Address tracing

Data logging (G06F 11/14, G06F 11/2205

take precedence)

Circuit details, i.e. tracer hardware

for I/O devices

for interfaces, buses

for systems

Preventing errors by testing or debugging software

Software analysis for verifying properties of

programs (byte-code verification G06F 9/44589)

using formal methods, e.g model checking,
abstract interpretation (theorem proving
G06N 5/006)

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)]
12/0292 . . . [using tables or multilevel address translation means (G06F 12/023 takes precedence; address translation in virtual memory systems G06F 12/10)]
12/04 . . . Addressing variable-length words or parts of words

12/06 . . . Addressing a physical block of locations, e.g. base addressing, module addressing, memory dedication (G06F 12/08 takes precedence)

NOTE
This group is limited to Module addressing or allocation; base addressing is classified in G06F 12/0223.

12/0607 . . . [Interleaved addressing]
12/0615 . . . [Address space extension]
12/0623 . . . [for memory modules]
12/063 . . . [for I/O modules, e.g. memory mapped I/O (I/O protocol G06F 13/42)]
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)]
12/0646 . . . [Configuration or reconfiguration]
12/0653 . . . [with centralised address assignment]
12/0661 . . . [and decentralised selection]
12/0669 . . . [with decentralised address assignment]
12/0676 . . . [the address being position dependent]
12/0684 . . . [with feedback, e.g. presence or absence of unit detected by addressing, overflow detection]
12/0692 . . . [Multiconfiguration, e.g. local and global addressing]
12/08 . . . in hierarchically structured memory systems, e.g. virtual memory systems
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]
12/0804 . . . [with main memory updating (G06F 12/0806 takes precedence)]
12/0806 . . . [Multiuser, multiprocessor or multiprocessor cache systems]
12/0808 . . . [with cache invalidating means (G06F 12/0815 takes precedence)]
12/0811 . . . [with multilevel cache hierarchies]
12/0813 . . . [with a network or matrix configuration]
12/0815 . . . [Cache consistency protocols]
12/0817 . . . [using directory methods]
12/082 . . . [Associative directories (G06F 12/0822 takes precedence)]
12/0822 . . . [Copy directories (local copy tags for implementing a bus snooping protocol G06F 12/0831)]
12/0824 . . . [Distributed directories, e.g. linked lists of caches]
12/0826 . . . [Limited directories, e.g. linked lists of caches]
12/0828 . . . [with concurrent directory accessing, i.e. handling multiple concurrent coherency transactions]
12/0831 . . . [using a bus scheme, e.g. with bus monitoring or watching means]
12/0833 . . . [in combination with broadcast means (e.g. for invalidation or updating)]
12/0835 . . . [for main memory peripheral accesses (e.g. I/O or DMA)]
Address translation
direct memory access [DMA]
for peripheral access to main memory, e.g. distributed shared memory systems

look-aside buffer [TLB]
address translation means, e.g. translation structure means using clearing, invalidating or resetting using selective caching, e.g. bypass with dedicated cache, e.g. instruction or stack access modes
Burst mode
Page mode
Parallel mode, e.g. in parallel with main memory or CPU
Variable-length word access
using selective caching, e.g. bypass using clearing, invalidating or resetting means
Caches characterised by their organisation or structure
of parts of caches, e.g. directory or tag array
with two or more cache hierarchy levels (with multilevel cache hierarchies [G06F 12/081])

replacement control
Replacement control
of the least frequently used [LFU] type, e.g. with individual count value
with age lists, e.g. queue, most recently used [MRU] list or least recently used [LRU] list

address translation
being minimized, e.g. non MRU
being generated by decoding an array or storage
with special data handling, e.g. priority of data or instructions, handling errors or pinning
using additional replacement algorithms
adapted to multidimensional cache systems, e.g. set-associative, multicache, multiset or multilevel
Protection against unauthorised use of memory [or access to memory]
by using cryptography (for digital transmission [H04L 9/00])
by checking the object accessibility, e.g. type of access defined by the memory independently of subject rights (G06F 12/1458 takes precedence)
the protection being physical, e.g. cell, word, block
for a module or a part of a module
for a range
the protection being virtual, e.g. for virtual blocks or segments before a translation
Protection against loss of memory contents (contains no material; see G06F 11/00)

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])
Program control for peripheral devices (G06F 13/14 - G06F 13/42 take precedence)
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)
where the programme performs an input/output emulation function
[Terminal emulation]
using hardware independent of the central processor, e.g. channel or peripheral processor
where hardware performs an I/O function other than control of data transfer

Protection against loss of memory contents (contains no material; see G06F 11/00)

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])
Program control for peripheral devices (G06F 13/14 - G06F 13/42 take precedence)
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)
where the programme performs an input/output emulation function
[Terminal emulation]
using hardware independent of the central processor, e.g. channel or peripheral processor
where hardware performs an I/O function other than control of data transfer
for access to common bus or bus system

( G06F 13/28 )

with centralised access control

using combination of interrupt and burst mode transfer

praecedence )

taking precedence )

access { DMA } , cycle steal ( G06F 13/32

using burst mode transfer, e.g. direct memory

access ( DMA ), cycle steal ( G06F 13/32

takes precedence )

[Details of memory controller]

[using buffers]

[using bus width]

[using multiple buses]

[Synchronisation and timing concerns

(synchronisation on a memory bus

G06F 13/4234 )]

[Configuration of memory controller to
different memory types]

based on priority control ( G06F 13/1605

takes precedence )

for access to input/output bus

using successive scanning, e.g. polling

(G06F 13/24

takes precedence )

[with priority control]

[using interrupt ( G06F 13/32

takes precedence )]

[with priority control]

[using burst mode transfer, e.g. direct memory

access ( DMA ), cycle steal ( G06F 13/32

takes precedence )

[Cycle stealing DMA ( G06F 13/30

takes precedence )]

[Halt processor DMA ( G06F 13/30

takes precedence )]

[Multiplexed DMA ( G06F 13/30

takes precedence )]

[with priority control]

[using combination of interrupt and burst mode

transfer]

[with priority control]

[for access to common bus or bus system]

[with centralised access control]

[using a time dependent access]

[using independent requests or grants, e.g.

using separated request and grant lines]

[using a centralised polling arbiter]

with decentralised access control

using a physical-position-dependent priority,
e.g. microprocessor, peripheral processor

or state-machine

and has means for transferring I/O

instructions and statuses between control unit

and main processor

[for dedicated transfers to a network ( for

protocol converters G06F 13/387 )]

Handling requests for interconnection or transfer

for access to memory bus ( G06F 13/28

takes precedence )

(based on arbitration ( arbitration in handling

access to a common bus or bus system

G06F 13/36 )

[with latency improvement]

[using a concurrent pipeline structure]

[by maintaining request order]

[by reordering requests]

[through address comparison]

[using refresh]

[with request queuing]

[with interleaved bank access]

[in a multiprocessor architecture

(interprocessor communication using

common memory G06F 15/167 )]

[Access to multiple memories]

[Access to shared memory]

[Details of memory controller]

[using buffers]

[using bus width]

[using multiple buses]

[Synchronisation and timing concerns

(synchronisation on a memory bus

G06F 13/4234 )]

[Configuration of memory controller to
different memory types]

based on priority control ( G06F 13/1605

takes precedence )

for access to input/output bus

using successive scanning, e.g. polling

(G06F 13/24

takes precedence )

[with priority control]

[using interrupt ( G06F 13/32

takes precedence )]

[with priority control]

[using burst mode transfer, e.g. direct memory

access ( DMA ), cycle steal ( G06F 13/32

takes precedence )

[Cycle stealing DMA ( G06F 13/30

takes precedence )]

[Halt processor DMA ( G06F 13/30

takes precedence )]

[Multiplexed DMA ( G06F 13/30

takes precedence )]

[with priority control]

[using combination of interrupt and burst mode

transfer]

[with priority control]

[for access to common bus or bus system]

[with centralised access control]

[using a time dependent access]

[using independent requests or grants, e.g.

using separated request and grant lines]

[using a centralised polling arbiter]
Digital computers in general (details G06F 1/00 – G06F 13/00); Data processing equipment in general

15/00

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))
therefor; File system structures therefor

Information retrieval; Database structures therefor; File system structures therefor

[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)]

[Details of file system administration, e.g. details of archiving or snapshots (file system backup G06F 11/14)]

[Details of conversion of file system types or formats]

[Details of migration of file systems (migration mechanisms in storage systems G06F 3/0647)]

[using management policies (backup systems G06F 11/1446; file migration policies for HSM systems G06F 16/185)]

[Details of the use of retention policies (retention policies for HSM systems G06F 16/185)]

[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)]

[Details of file access structures, e.g. distributed indices (arrangements of input from, or output to, record carriers G06F 3/06)]

[Using management policies (backup systems G06F 11/1446; file migration policies for HSM systems G06F 16/185)]

[Details of file access structures, e.g. distributed indices (arrangements of input from, or output to, record carriers G06F 3/06)]

[Details of file search processing]

[Query formulation]

[File search processing]

[Details of using file content signatures, e.g. hash values]

[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)]

[Details of file system administration, e.g. details of archiving or snapshots (file system backup G06F 11/14)]

[Details of conversion of file system types or formats]

[Details of migration of file systems (migration mechanisms in storage systems G06F 3/0647)]

[Details of conversion of file system types or formats]

[Details of file system administration, e.g. details of archiving or snapshots (file system backup G06F 11/14)]
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 3/0614)]

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 67/107)]

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 67/107)]

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.
Querying
Query formulation
{ Updating materialised views }
{ Updates performed during online database operations }
{ Updates performed during offline database operations }
{ Ensuring data consistency and integrity }
( replication G06F 16/27 )
{ Change logging, detection, and notification }
{ Update request formulation }

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.

OPTIMISTIC CONCURRENCY CONTROL

Groups G06F 16/2336 and G06F 16/2343 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.

PESSIMISTIC CONCURRENCY CONTROL APPROACHES, E.G. LOCKING OR MULTIPLE VERSIONS WITHOUT TIME STAMPS

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.

LOCKING METHODS, E.G. DISTRIBUTED LOCKING OR LOCKING IMPLEMENTATION DETAILS

16/235 ........ [Update request formulation]
16/2358 ....... [Change logging, detection, and notification (replication G06F 16/227)]
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]

... (Concurrency control (transaction processing G06F 9/466))

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 16/23.
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 16/23.
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 16/329, G06F 16/332, 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 16/339, G06F 16/34, G06F 16/345, G06F 16/35, G06F 16/352, 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 visualisation, e.g. category, hierarchy or range presentation and selection}
16/3325 . . . . . {Reformulation based on results of preceding query}
using relevance feedback from the user, e.g. relevance feedback on documents, documents sets, document terms or passages

[using graphical result space presentation or visualisation]

[Natural language query formulation or dialogue systems]

[Query processing]

[Query translation]

[Selection or weighting of terms from queries, including natural language queries]

[Syntactic pre-processing, e.g. stopword elimination, stemming]

[Query expansion]

[Query execution (G06F 16/335 takes precedence)]

[using boolean model]

[using phonetics]

[using natural language analysis]

[using probabilistic model]

[using vector based model]

[Reuse of stored results of previous queries]

[Filtering based on additional data, e.g. user or group profiles (filtering in web context G06F 16/9535, G06F 16/9536)]

[Profile generation, learning or modification]

[Presentation of query results]

[Browsing; Visualisation therefor]

[Summarisation for human users]

[Clustering; Classification]

[Class or cluster creation or modification]

[Browsing; Visualisation therefor]

[Creation of semantic tools, e.g. ontology or thesauri]

[Ontology]

[Thesaurus]

[Retrieval characterised by using metadata, e.g. metadata not derived from the content or metadata generated manually]

[using identifiers, e.g. barcodes, RFIDs (for URLs G06F 16/9554)]

[using citations (hypermedia G06F 16/94)]

[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.

[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.

[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.

[Indexing; Data structures therefor; Storage structures]

**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.
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.

[using audio data]

Filtering based on additional data, e.g. user or group profiles

[using biological or physiological data of a human being, e.g. blood pressure, facial expression, gestures]

[Administration of user profiles, e.g. generation, initialisation, adaptation, distribution]

Presentation of query results

[based on data]

Multimedia presentations, e.g. slide shows, multimedia albums]

Browsing; Visualisation therefor

[Temporal browsing, e.g. timeline]

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.

**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, 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.

Indexing; Data structures therefor; Storage structures

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.

**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.
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.

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.

Browsing; Visualisation therefor

**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.

having vectorial format

**WARNING**

Group G06F 16/50 is impacted by reclassification into group G06F 16/50.
Groups G06F 16/50 and G06F 16/55 should be considered in order to perform a complete search.

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 16/58.
Groups G06F 16/50 and G06F 16/58 should be considered in order to perform a complete search.

using metadata automatically derived from the content

**WARNING**

Group G06F 16/583 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.

using metadata automatically derived from the content

**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.

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.
16/63 . . . 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 16/67.
Groups G06F 16/68 and G06F 16/67 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 16/67.
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-ordinary, 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 16/72.
Groups G06F 16/73 and G06F 16/72 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)]
[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)]

[Query language or query format]

Filtering based on additional data, e.g. user or group profiles

Presentation of query results

[in form of a video summary, e.g. the video summary being a video sequence, a composite still image or having synthesized frames]

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)

[a collection of video files or sequences]

[the internal structure of a single video sequence]

[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)]

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.

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.

using metadata automatically derived from the content

[using audio features]

[using objects detected or recognised in the video content]

[the detected or recognised objects being people]

[using original textual content or text extracted from visual content or transcript of audio data]

[using low-level visual features of the video content]

[using colour or luminescence]

[using shape (G06F 16/7837 takes precedence)]

[using texture (G06F 16/7837 takes precedence)]

(using motion, e.g. object motion or camera motion)

(using domain-transform features, e.g. DCT or wavelet transform coefficients)

[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.

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.

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)

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.

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.

Query formulation

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.

[Query translation]

[Query optimisation]

[Query execution]

Presentation of query results

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.

**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 16/908 should be considered in order to perform a complete search.

16/93 . . . Document management systems
16/94 . . . Hyperlinking G06F 40/134
16/95 . . . Retrieval from the web
**G06F**

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**.

Groups **G06F 16/951** and **G06F 16/953** 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 16/951**.

Groups **G06F 16/951** 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**)
17/153 . . . [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)]
17/40 . . . Data acquisition and logging (for input to computer G06F 3/00)
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)

**WARNING**

Group G06F 19/00 is no longer used for the classification of documents as of 02-01-2019. The content of this group is being reclassified into group G16Z 99/00.

Groups G06F 19/00 and G16Z 99/00 should be considered in order to perform a complete search.

19/32 . . . [Medical data management, e.g. systems or 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. 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 G06F 7/00/12)]

**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. 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 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.
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.

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.

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 be considered in order to perform a complete search.

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.

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.

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.

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.

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.
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.

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.

Security arrangements for protecting computers, components thereof, programs or data against unauthorised activity

21/00

21/10 . Protecting distributed programs or content, e.g. vending or licensing of copyrighted material

21/105 . [Tools for software license management or administration, e.g. managing licenses at corporate level]

21/12 . Protecting executable software

21/121 . [Restricting unauthorised execution of programs]

21/123 . . . . [by using dedicated hardware, e.g. dongles, smart cards, cryptographic processors, global positioning systems [GPS] devices]

21/125 . . . . [by manipulating the program code, e.g. source code, compiled code, interpreted code, machine code]

21/126 . . . . . [Interacting with the operating system]

21/128 . . . . . [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]

21/14 . . . against software analysis or reverse engineering, e.g. by obfuscation

21/16 . . . Program or content traceability, e.g. by watermarking

21/30 . Authentication, i.e. establishing the identity or authorisation of security principals

21/305 . . . [by remotely controlling device operation]

21/31 . . . User authentication

21/313 . . . [using a call-back technique via a telephone network]

21/316 . . . [by observing the pattern of computer usage, e.g. typical user behaviour]

21/32 . . . using biometric data, e.g. fingerprints, iris scans or voiceprints

21/33 . . . using certificates

21/335 . . . . . [for accessing specific resources, e.g. using Kerberos tickets]

21/34 . . . involving the use of external additional devices, e.g. dongles or smart cards

21/35 . . . . . communicating wirelessly

21/36 . . . by graphic or iconic representation

21/40 . . . by quorum, i.e. whereby two or more security principals are required

21/41 . . . where a single sign-on provides access to a plurality of computers

21/42 . . . . . using separate channels for security data

21/44 . . . . . . wireless channels

21/44 . . . . . . Program or device authentication

21/445 . . . . . . [by mutual authentication, e.g. between devices or programs]

21/45 . . . . . . Structures or tools for the administration of authentication

21/46 . . . . . by designing passwords or checking the strength of passwords

21/50 . . . Monitoring users, programs or devices to maintain the integrity of platforms, e.g. of processors, firmware or operating systems

21/51 . . . at application loading time, e.g. accepting, rejecting, starting or inhibiting executable software based on integrity or source reliability

21/52 . . . . . during program execution, e.g. stack integrity { ; Preventing unwanted data erasure; Buffer overflow}

21/53 . . . . . by executing in a restricted environment, e.g. sandbox or secure virtual machine

21/54 . . . . . by adding security routines or objects to programs

21/55 . . . 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 dedicated virus, restoring damaged files]
leads to protection of the entire computer components, in which the protection of a component Protecting specific internal or peripheral data. Protecting data integrity, e.g. using checksums, keys or access control rules Protecting access to data via a platform, e.g. using devices or processes }, Tools and structures for managing or certifying or maintaining trusted computer operating in dual or compartmented mode, i.e. identification, e.g. serial numbers by creating or determining hardware in cryptographic circuits using a third party to features or functions of an application distributed file system or database to a system of files or objects, e.g. local or object itself or with access control rules appended to the envelope, encrypted and accessed using a key, to a single file or object, e.g. in a secure platform, e.g. secure boots or power-downs, preventing unauthorized use of memory {using a security table for the storage subsystem}, by operating on the power supply, e.g. enabling or disabling power-on, sleep or resume operations Protecting input, output or interconnection devices input devices, e.g. keyboards, mice or controllers thereof output devices, e.g. displays or monitors interconnection devices, e.g. bus-connected or in-line devices Secure or tamper-resistant housings by means of encapsulation, e.g. for integrated circuits Detecting or preventing theft or loss

30/00 Computer-aided design [CAD]

NOTE
In this group, it is desirable to add the indexing codes of groups G06F 2111/00 - G06F 2119/00.

WARNING
Group G06F 30/00 is impacted by reclassification into groups G06F 30/10, G06F 30/12, G06F 2111/00 - G06F 2119/22.
Groups G06F 30/00, G06F 30/10, G06F 30/12, and G06F 2111/00 - G06F 2119/22 should be considered in order to perform a complete search.

30/10 Geometric CAD

WARNING
Group G06F 30/10 is incomplete pending reclassification of documents from group G06F 30/00.

Groups G06F 30/00 and G06F 30/10 should be considered in order to perform a complete search.
characterised by design entry means specially adapted for CAD, e.g. graphical user interfaces [GUI] specially adapted for CAD

**WARNING**

Group G06F 30/12 is incomplete pending reclassification of documents from groups G06F 30/00, G06F 30/17, and G06F 30/18.

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

Architectural design, e.g. computer-aided architectural design [CAAD] related to design of buildings, bridges, landscapes, production plants or roads

Vehicle, aircraft or watercraft design

Mechanical parametric or variational design

**WARNING**

Group G06F 30/17 is impacted by reclassification into groups G06F 30/12 and G06F 2111/00 - G06F 2119/22.

Groups G06F 30/17, G06F 30/12 and G06F 2111/00 - G06F 2119/22 should be considered in order to perform a complete search.

Network design, e.g. design based on topological or interconnect aspects of utility systems, piping, heating ventilation air conditioning [HVAC] or cabling (circuit design at the physical level G06F 30/39; network planning tools for wireless communication networks H04W 16/18)

**WARNING**

Group G06F 30/18 is impacted by reclassification into groups G06F 30/12 and G06F 2111/00 - G06F 2119/22.

Groups G06F 30/18, G06F 30/12 and G06F 2111/00 - G06F 2119/22 should be considered in order to perform a complete search.

Design optimisation, verification or simulation (optimisation, verification or simulation of circuit designs G06F 30/30)

**WARNING**

Group G06F 30/20 is impacted by reclassification into groups G06F 30/25, G06F 30/27, G06F 30/28 and G06F 2111/00 - G06F 2119/22.

Groups G06F 30/20, G06F 30/25, G06F 30/27, G06F 30/28 and G06F 2111/00 - G06F 2119/22 should be considered in order to perform a complete search.

using Petri net models

using finite element methods [FEM] or finite difference methods [FDM]

**WARNING**

Group G06F 30/23 is impacted by reclassification into groups G06F 30/25, G06F 30/37, G06F 30/39 and G06F 2111/00 - G06F 2119/22.

Groups G06F 30/23, G06F 30/25, G06F 30/37, G06F 30/39 and G06F 2111/00 - G06F 2119/22 should be considered in order to perform a complete search.

using particle-based methods

**WARNING**

Group G06F 30/25 is incomplete pending reclassification of documents from groups G06F 30/20 and G06F 30/23.

Groups G06F 30/20, G06F 30/23, and G06F 30/25 should be considered in order to perform a complete search.

using machine learning, e.g. artificial intelligence, neural networks, support vector machines [SVM] or training a model

**WARNING**

Group G06F 30/27 is incomplete pending reclassification of documents from group G06F 30/20.

Groups G06F 30/20 and G06F 30/27 should be considered in order to perform a complete search.

using fluid dynamics, e.g. using Navier-Stokes equations or computational fluid dynamics [CFD]

**WARNING**

Group G06F 30/28 is incomplete pending reclassification of documents from group G06F 30/20.

Groups G06F 30/20 and G06F 30/28 should be considered.

Circuit design

**WARNING**

Group G06F 30/30 is impacted by reclassification into groups G06F 30/31, G06F 30/32, G06F 30/23, G06F 30/33, G06F 30/34, G06F 30/343, G06F 30/347, G06F 30/38 and G06F 2111/00 - G06F 2119/22.

Groups G06F 30/30, G06F 30/31, G06F 30/32, G06F 30/23, G06F 30/33, G06F 30/34, G06F 30/343, G06F 30/347, G06F 30/38 and G06F 2111/00 - G06F 2119/22 should be considered in order to perform a complete search.
**30/31**  Design entry, e.g. editors specifically adapted for circuit design

**WARNING**
- Group G06F 30/31 is incomplete pending reclassification of documents from groups G06F 30/30, G06F 30/34, and G06F 30/36.
- All groups listed in this Warning should be considered in order to perform a complete search.

**30/32**  Circuit design at the digital level (reconfigurable circuits G06F 30/34)

**WARNING**
- Group G06F 30/32 is incomplete pending reclassification of documents from group G06F 30/30.
- Groups G06F 30/30 and G06F 30/32 should be considered in order to perform a complete search.

**30/323**  Translation or migration, e.g. logic to logic, hardware description language [HDL] translation or netlist translation

**WARNING**
- Group G06F 30/323 is incomplete pending reclassification of documents from groups G06F 30/30 and G06F 30/327.
- Groups G06F 30/30, G06F 30/327, and G06F 30/323 should be considered in order to perform a complete search.

**30/327**  Logic synthesis; Behaviour synthesis, e.g. mapping logic, HDL to netlist, high-level language to RTL or netlist

**WARNING**
- Group G06F 30/327 is impacted by reclassification into groups G06F 30/323 and G06F 30/327.
- Groups G06F 30/327, G06F 30/323, and G06F 30/327 should be considered in order to perform a complete search.

**30/33**  Design verification, e.g. functional simulation or model checking

**WARNING**
- Group G06F 30/33 is impacted by reclassification into groups G06F 30/3308, G06F 30/3315, and G06F 30/3312.
- Groups G06F 30/33, G06F 30/3308, G06F 30/3315, and G06F 30/3312 should be considered in order to perform a complete search.

**30/3308**  using simulation

**WARNING**
- Group G06F 30/3308 is incomplete pending reclassification of documents from group G06F 30/33.
- Groups G06F 30/33 and G06F 30/3308 should be considered in order to perform a complete search.

**30/331**  with hardware acceleration, e.g. by using field programmable gate array [FPGA] or emulation

**30/3312**  Timing analysis

**WARNING**
- Group G06F 30/3312 is impacted by reclassification into groups G06F 30/3315 and G06F 2111/00 - G06F 2119/22.
- Groups G06F 30/3312, G06F 30/3315, and G06F 2111/00 - G06F 2119/22 should be considered in order to perform a complete search.

**30/3315**  using static timing analysis [STA]

**WARNING**
- Group G06F 30/3315 is incomplete pending reclassification of documents from groups G06F 30/33 and G06F 30/3312.
- Groups G06F 30/33, G06F 30/3312, and G06F 30/3315 should be considered in order to perform a complete search.

**30/3323**  using formal methods, e.g. equivalence checking or property checking

**30/333**  Design for testability [DFT], e.g. scan chain or built-in self-test [BIST]

**WARNING**
- Group G06F 30/333 is incomplete pending reclassification of documents from group G06F 30/30.
- Groups G06F 30/30 and G06F 30/333 should be considered in order to perform a complete search.

**30/337**  Design optimisation

**WARNING**
- Group G06F 30/337 is incomplete pending reclassification of documents from group G06F 30/30.
- Groups G06F 30/30 and G06F 30/337 should be considered in order to perform a complete search.
30/34 . . . for reconfigurable circuits, e.g. field programmable gate arrays [FPGA] or programmable logic devices [PLD]

**WARNING**

Group G06F 30/34 is incomplete pending reclassification of documents from group G06F 30/30.

Group G06F 30/34 is impacted by reclassification into groups G06F 30/31, G06F 30/343, G06F 30/347 and G06F 2111/00 - G06F 2119/22.

Groups G06F 30/34, G06F 30/31, G06F 30/343, G06F 30/347 and G06F 2111/00 - G06F 2119/22 should be considered in order to perform a complete search.

30/343 . . . Logical level

**WARNING**

Group G06F 30/343 is incomplete pending reclassification of documents from groups G06F 30/30 and G06F 30/34.

Groups G06F 30/30, G06F 30/34, and G06F 30/343 should be considered in order to perform a complete search.

30/347 . . . Physical level, e.g. placement or routing

**WARNING**

Group G06F 30/347 is incomplete pending reclassification of documents from groups G06F 30/30, G06F 30/34, G06F 30/343, and G06F 30/39.

Groups G06F 30/347, G06F 30/30, G06F 30/34, G06F 30/343 and G06F 30/39 should be considered in order to perform a complete search.

30/35 . . . Delay-insensitive circuit design, e.g. asynchronous or self-timed

30/36 . . . Circuit design at the analogue level

**WARNING**

Group G06F 30/36 is impacted by reclassification into groups G06F 30/31, G06F 30/373, G06F 30/38 and G06F 2111/00 - G06F 2119/22.

Groups G06F 30/36, G06F 30/31, G06F 30/373, G06F 30/38 and G06F 2111/00 - G06F 2119/22 should be considered in order to perform a complete search.

30/367 . . . Design verification, e.g. using simulation, simulation program with integrated circuit emphasis [SPICE], direct methods or relaxation methods

**WARNING**

Group G06F 30/367 is incomplete pending reclassification of documents from group G06F 30/23.

Groups G06F 30/23 and G06F 30/367 should be considered in order to perform a complete search.

30/373 . . . Design optimisation

**WARNING**

Group G06F 30/373 is incomplete pending reclassification of documents from group G06F 30/36.

Groups G06F 30/36 and G06F 30/373 should be considered in order to perform a complete search.

30/38 . . . Circuit design at the mixed level of analogue and digital signals

**WARNING**

Group G06F 30/38 is incomplete pending reclassification of documents from groups G06F 30/30 and G06F 30/36.

Groups G06F 30/30, G06F 30/36, and G06F 30/38 should be considered in order to perform a complete search.

30/39 . . . Circuit design at the physical level (physical level design for reconfigurable circuits G06F 30/347)

**WARNING**

Group G06F 30/39 is impacted by reclassification into groups G06F 30/347, G06F 30/396, G06F 30/398 and G06F 2111/00 - G06F 2119/22.

Groups G06F 30/39, G06F 30/347, G06F 30/396, G06F 30/398 and G06F 2111/00 - G06F 2119/22 should be considered in order to perform a complete search.

30/392 . . . Floor-planning or layout, e.g. partitioning or placement

**WARNING**

Group G06F 30/392 is impacted by reclassification into groups G06F 30/396 and G06F 2111/00 - G06F 2119/22.

Groups G06F 30/392, G06F 30/396 and G06F 2111/00 - G06F 2119/22 should be considered in order to perform a complete search.

30/394 . . . Routing (G06F 30/396 takes precedence)

**WARNING**

Group G06F 30/394 is impacted by reclassification into groups G06F 30/3947, G06F 30/3953, G06F 30/396 and G06F 2111/00 - G06F 2119/22.

Groups G06F 30/394, G06F 30/3947, G06F 30/3953, G06F 30/396 and G06F 2111/00 - G06F 2119/22 should be considered in order to perform a complete search.
G06F

30/3947 . . . global

**WARNING**

Group G06F 30/3947 is incomplete pending reclassification of documents from group G06F 30/394.

Groups G06F 30/394 and G06F 30/3947 should be considered in order to perform a complete search.

30/3953 . . . detailed

**WARNING**

Group G06F 30/3953 is incomplete pending reclassification of documents from group G06F 30/394.

Groups G06F 30/394 and G06F 30/3953 should be considered in order to perform a complete search.

30/396 . . . Clock trees

**WARNING**

Group G06F 30/396 is incomplete pending reclassification of documents from groups G06F 30/39, G06F 30/392, and G06F 30/394.

Group G06F 30/396 is also impacted by reclassification into group G06F 211704.

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

30/398 . . . Design verification or optimisation, e.g. using design rule check [DRC], layout versus schematics [LVS] or finite element methods [FEM] (optical proximity correction [OPC], G03F 1/36)

**WARNING**

Group G06F 30/398 is incomplete pending reclassification of documents from groups G06F 30/23 and G06F 30/39.

Groups G06F 30/23, G06F 30/39 and G06F 30/398 should be considered in order to perform a complete search.

40/00 Handling natural language data (speech analysis or synthesis, speech recognition G10L)

40/10 . . . Text processing (natural language analysis G06F 40/70; semantic analysis G06F 40/30; processing or translation of natural language G06F 40/40)

40/103 . . . Formatting, i.e. changing of presentation of documents (automatic justification G06F 40/189; automatic line break hyphenation G06F 40/191)

40/106 . . . Display of layout of documents; Previewing

40/109 . . . Font handling; Temporal or kinetic typography

40/111 . . . Mathematical or scientific formatting; Subscripts; Superscripts

40/114 . . . Pagination

40/117 . . . Tagging; Marking up (details of markup languages G06F 40/143); Designating a block; Setting of attributes (style sheets, e.g. eXtensible Stylesheet Language Transformation [XSLT], G06F 40/154)

40/12 . . . Use of codes for handling textual entities

40/123 . . . Storage facilities

40/126 . . . Character encoding

40/129 . . . Handling non-Latin characters, e.g. kana-to-kanji conversion

40/131 . . . Fragmentation of text files, e.g. creating reusable text-blocks; Linking to fragments, e.g. using XInclude; Namespaces

40/134 . . . Hyperlinking

40/137 . . . Hierarchical processing, e.g. outlines

40/14 . . . Tree-structured documents (parsing G06F 40/205; validation G06F 40/226)

**WARNING**

Group G06F 40/14 is impacted by reclassification into group G06F 40/143.

Groups G06F 40/14 and G06F 40/143 should be considered in order to perform a complete search.

40/143 . . . Markup, e.g. Standard Generalized Markup Language [SGML] or Document Type Definition [DTD]

**WARNING**

Group G06F 40/143 is incomplete pending reclassification of documents from group G06F 40/14.

Groups G06F 40/14 and G06F 40/143 should be considered in order to perform a complete search.

40/146 . . . Coding or compression of tree-structured data

40/149 . . . Adaptation of the text data for streaming purposes, e.g. Efficient XML Interchange [EXI] format

40/151 . . . Transformation

40/154 . . . Tree transformation for tree-structured or markup documents, e.g. XSLT, XSL-FO or stylesheets

40/157 . . . using dictionaries or tables

40/16 . . . Automatic learning of transformation rules, e.g. from examples

40/163 . . . Handling of whitespace

40/166 . . . Editing, e.g. inserting or deleting

40/169 . . . Annotation, e.g. comment data or footnotes

40/171 . . . by use of digital ink

40/174 . . . Form filling; Merging

40/177 . . . of tables; using ruled lines

40/18 . . . of spreadsheets (form-filling G06F 40/174)

40/183 . . . Tabulation, i.e. one-dimensional positioning

40/186 . . . Templates

40/189 . . . Automatic justification

40/191 . . . Automatic line break hyphenation

40/194 . . . Calculation of difference between files

40/197 . . . Version control (for software G06F 8/71)
Natural language analysis (semantic analysis of natural language G06F 40/30)

**WARNING**

Group G06F 40/20 is impacted by recategorisation into group G06F 40/237.

**WARNING**

Group G06F 40/20 is incomplete pending reclassification of documents from group G06F 40/20.

**WARNING**

Group G06F 40/237 is incomplete pending reclassification of documents from group G06F 40/20.

**WARNING**

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

Indexing scheme relating to the type of digital function generated

- Linear multivariable functions, i.e. sum of products
- Trigonometric functions
- Co-ordinate transformations
- Powers or roots
- Logarithmic or exponential functions
- Reciprocal functions
- Probability distribution functions
- PCM companding functions

Indexing scheme associated with group G06F 30/00, relating to CAD techniques

- Details relating to CAD techniques

**WARNING**

Groups G06F 2111/00 - G06F 2111/20 are incomplete pending reclassification of documents from groups G06F 30/00, G06F 30/17, G06F 30/18, G06F 30/20, G06F 30/23, G06F 30/30, G06F 30/327, G06F 30/33, G06F 30/3312, G06F 30/34, G06F 30/36, G06F 30/39, G06F 30/392, and G06F 30/394.

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

Details relating to CAD techniques

- CAD in a network environment, e.g. collaborative CAD or distributed simulation
- Constraint-based CAD
- Multi-objective optimisation, e.g. Pareto optimisation using simulated annealing [SA], ant colony algorithms or genetic algorithms [GA]
- Probabilistic or stochastic CAD
- Numerical modelling
- Symbolic schematics
- related to nanotechnology
- Customisation or personalisation
- using virtual or augmented reality
- Configuration CAD, e.g. designing by assembling or positioning modules selected from libraries of predesigned modules

Indexing scheme associated with group G06F 30/00, relating to the application field

Details relating to the application field

**WARNING**

Groups G06F 2113/00 - G06F 2113/28 are incomplete pending reclassification of documents from groups G06F 30/00, G06F 30/17, G06F 30/18, G06F 30/20, G06F 30/23, G06F 30/30, G06F 30/327, G06F 30/33, G06F 30/3312, G06F 30/34, G06F 30/36, G06F 30/39, G06F 30/392, and G06F 30/394.

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

- Data centres
- Power grid distribution networks
- Wind turbines or wind farms
- Fluids
- Additive manufacturing, e.g. 3D printing
- Cloth
- Pipes
Details relating to the type or aim of the circuit

**WARNING**

Groups G06F 2115/00, G06F 2117/00 are incomplete pending reclassification of documents from groups G06F 30/00, G06F 30/17, G06F 30/18, G06F 30/20, G06F 30/23, G06F 30/25, G06F 30/26, G06F 30/30, G06F 30/32, G06F 30/33, G06F 30/34, G06F 30/36, G06F 30/39, G06F 30/392, G06F 30/394. All groups listed in this Warning should be considered in order to perform a complete search.

Details relating to the type or aim of the circuit design

**WARNING**

Groups G06F 2117/00, G06F 2117/12 are incomplete pending reclassification of documents from groups G06F 30/00, G06F 30/17, G06F 30/18, G06F 30/20, G06F 30/23, G06F 30/25, G06F 30/26, G06F 30/30, G06F 30/32, G06F 30/33, G06F 30/34, G06F 30/36, G06F 30/39, G06F 30/392, G06F 30/394. All groups listed in this Warning should be considered in order to perform a complete search.

Details relating to the type or aim of the analysis or the optimisation

**WARNING**

Groups G06F 2119/00 - G06F 2119/22 are incomplete pending reclassification of documents from groups G06F 30/00, G06F 30/17, G06F 30/18, G06F 30/20, G06F 30/23, G06F 30/30, G06F 30/32, G06F 30/33, G06F 30/34, G06F 30/36, G06F 30/39, G06F 30/392, and G06F 30/394. All groups listed in this Warning should be considered in order to perform a complete search.
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
2200/1638 . . . Computer housing designed to operate in both desktop and tower orientation
2200/1639 . . . Arrangements for locking plugged peripheral connectors
2200/20 . . . Indexing scheme relating to G06F 1/20
2200/201 . . . Cooling arrangements using cooling fluid
2200/202 . . . Air convective hinge
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 11/4884)
2201/82 . . . Solving problems relating to consistency (ensuring consistency in mirrored systems G06F 11/2064)
2201/825 . . . the problem or solution involving locking
2201/83 . . . the solution involving signatures
2201/835 . . . Timestamp
2201/84 . . . Using snapshots, i.e. a logical point-in-time copy of the data
2201/845 . . . Systems in which the redundancy can be transformed in increased performance
2201/85 . . . Active fault masking without idle spares (active fault masking without idle spare hardware where processing functionality is redundant G06F 11/2035)
2201/855 . . . Details of asynchronous mirroring using a journal to transfer not-yet-mirrored changes
2201/86 . . . Event-based monitoring
2201/865 . . . Monitoring of software
2201/87 . . . Monitoring of transactions
2201/875 . . . Monitoring of systems including the internet
2201/88 . . . Monitoring involving counting
2201/885 . . . Monitoring specific for caches
2203/00 Indexing scheme relating to G06F 3/00 - G06F 3/048
2203/01 . . . Indexing scheme relating to G06F 3/01
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
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
2203/013 . . . Force feedback applied to a game
2203/014 . . . Force feedback applied to GUI
2203/015 . . . Force feedback applied to a joystick
2203/033 . . . Indexing scheme relating to G06F 3/033
2203/0331 . . . Finger worn pointing device
2203/0332 . . . Ergonomic shaped mouse adjustable to suit one of both hands
2203/0333 . . . Ergonomic shaped mouse for one hand
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
2203/0335 . . . Finger operated miniaturized mouse
2203/0336 . . . Mouse integrated fingerprint sensor
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
2203/0338 . . . Fingerprint track pad, i.e. fingerprint sensor used as pointing device tracking the fingertip image
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
2203/038 . . . Indexing scheme relating to G06F 3/038
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
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
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

WARNING
Group G06F 2203/041 is impacted by reclassification into group G06F 2203/04114.
Groups G06F 2203/041 and G06F 2203/04114 should be considered in order to perform a complete search.

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 . . . Pressure sensors for measuring the pressure or force exerted on the touch surface without providing the touch position
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

Shielding in digitiser, i.e. guard or shielding arrangements, mostly for capacitive touchscreens, e.g. driven shields, driven grounds

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

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

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

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

Peripheral electrode pattern in resistive digitisers, i.e. electrodes at the periphery of the resistive sheet are shaped in patterns enhancing linearity of induced field

Touch screens adapted for alternating or simultaneous interaction with active pens and passive pointing devices like fingers or passive pens

WARNING

Group G06F 2203/04114 is incomplete pending reclassification of documents from group G06F 2203/041. Groups G06F 2203/041 and G06F 2203/04114 should be considered in order to perform a complete search.

Indexing scheme relating to G06F 3/048

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

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

Split screen, i.e. subdividing the display area or the window area into separate subareas

Transparency, e.g. transparent or translucent windows

Virtual magnifying lens, i.e. window or frame movable on top of displayed information to enlarge it for better reading or selection

Zoom, i.e. interaction techniques or interactors for controlling the zooming operation

Pen manipulated menu

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

Textured surface identifying touch areas, e.g. overlay structure for a virtual keyboard

Indexing scheme relating to group G06F 5/00;
Methods or arrangements for data conversion without changing the order or content of the data handled

Reformatting, i.e. changing the format of data representation

Indexing scheme relating to groups G06F 5/06 - G06F 5/16

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

Allowing rewriting or rereading data to or from the buffer

Dynamically variable buffer size

Linked list, i.e. structure using pointers, e.g. allowing non-contiguous address segments in one logical buffer or dynamic buffer space allocation

With bypass possibility

User-programmable number or size of buffers, i.e. number of separate buffers or their size can be allocated freely

Bidirectional FIFO, i.e. system allowing data transfer in two directions

Indexing scheme relating to groups G06F 5/10 - G06F 5/14

Avoiding metastability, i.e. preventing hazards, e.g. by using Gray code counters

Delay lines

Details of pointers, i.e. structure of the address generators

Reading or writing the data blockwise, e.g. using an extra end-of-block pointer

Indexing scheme relating to groups G06F 5/12 - G06F 5/14

Contention resolution, i.e. resolving conflicts between simultaneous read and write operations

Monitoring of intermediate fill level, i.e. with additional means for monitoring the fill level, e.g. half full flag, almost empty flag

Indexing scheme related to dedicated interfaces for computers

Indexing scheme related to storage interfaces for computers, indexing schema related to group G06F 3/06

Defragmentation

Graphical user interface [GUI]

Load balancing

One time programmable [OTP] memory, e.g. PROM, WORM

Indexing scheme related to printer interfaces for computers, indexing schema related to group G06F 3/12

Cost estimation

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
2207/20 . . . 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
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 . . . . Alteration 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 and 4, 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
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
2207/558 . . Indexing scheme relating to groups
   G06F 7/558 - 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 isomorphic or projective curve
2207/7233 . . Masking, e.g. (A**e+r) mod n
2207/7238 . . Operand masking, i.e. message blinding, e.g. (A+r)**e mod n; k.(P+R)
2207/7242 . . Exponent masking, i.e. key masking, e.g. A**e mod n; (k+r).P
2207/7247 . . Modulo masking, e.g. A**e mod (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
2207/7278 . . using repeated square-and-multiply, i.e. right-to-left binary exponentiation
2207/7285 . . using the window method, i.e. left-to-right karay 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
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2209/50 . . Indexing scheme relating to G06F 9/50
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2209/5011 . . Pool
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2209/5016 . . Session
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2209/503 . . . Resource availability
2209/504 . . . Resource capping
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2209/507 . . . Low-level
2209/508 . . . Monitor
2209/509 . . . Offload
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2209/521 . . . Atomic
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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 3000 - G06F 13/00
2211/001 . . . In-Line Device
2211/005 . . . 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
2211/1004 . . . Adaptive RAID, i.e. RAID system adapts to changing circumstances, e.g. RAID1 becomes RAID5 as disks fill up
2211/1007 . . . Addressing errors, i.e. silent errors in RAID, e.g. sector slipping and addressing errors
2211/1009 . . . Cache, i.e. caches used in RAID system with parity
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
2211/1014 . . . Compression, i.e. RAID systems with parity using compression techniques
2211/1016 . . . Continuous RAID, i.e. RAID system that allows streaming or continuous media, e.g. VOD
2211/1019 . . . Fast writes, i.e. signaling the host that a write is done before data is written to disk
2211/1021 . . . Different size blocks, i.e. mapping of blocks of different size in RAID systems with parity
2211/1023 . . . Different size disks, i.e. non uniform size of disks in RAID systems with parity
2211/1026 . . . Different size groups, i.e. non uniform size of groups in RAID systems with parity
2211/1028 . . . Distributed, i.e. distributed RAID systems with parity
2211/103 . . . Hybrid, i.e. RAID systems with parity comprising a mix of RAID types
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
2211/1035 . . . Keeping track, i.e. keeping track of data and parity changes
2211/1038 . . . LFS, i.e. Log Structured File System used in RAID systems with parity
2211/104 . . . Metadata, i.e. metadata associated with RAID systems with parity
2211/1042 . . . NanoRAID, i.e. RAID systems using nanotechnology
2211/1045 . . . Nested RAID, i.e. implementing a RAID scheme in another RAID scheme
2211/1047 . . . No striping, i.e. parity calculation on a RAID involving no stripes, where a stripe is an independent set of data
2211/105 . . . On the fly coding, e.g. using XOR accumulators
2211/1052 . . . RAID padding, i.e. completing a redundancy group with dummy data
2211/1054 . . . Parity-fast hardware, i.e. dedicated fast hardware for RAID systems with parity
2211/1057 . . . Parity-multiple bits-RAID6, i.e. RAID 6 implementations
2211/1059 . . . Parity-single bit-RAID5, i.e. RAID 5 implementations
2211/1061 . . . Parity-single bit-RAID4, i.e. RAID 4 implementations
2211/1064 . . . Parity-single bit-RAID3, i.e. RAID 3 implementations
2211/1066 . . . Parity-small-writes, i.e. improved small or partial write techniques in RAID systems
2211/1069 . . . Phantom write, i.e. write were nothing is actually written on the disk of a RAID system
2211/1071 . . . Power loss, i.e. interrupted writes due to power loss in a RAID system
2211/1073 . . . Problems due to wear-out failures in RAID systems
2211/1076 . . . RAIP, i.e. RAID on platters
2211/1078 . . . RAIR, i.e. RAID on removable media
2211/108 . . . RAIT, i.e. RAID on tape drive
2211/1083 . . . Reserve area on a disk of a RAID system
2211/1085 . . . RMW, i.e. Read-Modify-Write method for RAID systems
2211/1088 . . . Scrubbing in RAID systems with parity
2211/109 . . . Sector level checksum or ECC, i.e. sector or stripe level checksum or ECC in addition to the RAID parity calculation
2211/1092 . . . Single disk raid, i.e. RAID with parity on a single disk
2211/1095 . . . Writes number reduction, i.e. reducing the number of writes in a RAID array with parity
2211/1097 . . . Boot, Start, Initialise, Power
2211/902 . . . Spectral purity improvement for digital function generators by adding a dither signal, e.g. noise
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<td>2212/464</td>
<td>Multimedia object, e.g. image, video</td>
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</table>
Details relating to flash memory management

- Control mechanisms for virtual memory, cache or TLB
- Details of cache memory
- Reconfiguration of cache memory
- Details of operating mode, e.g. cache mode or local memory mode
- Using a prefetch buffer or dedicated prefetch cache
- History based prefetching
- Prefetching based on access pattern detection, e.g. stride based prefetch
- Prefetching based on hints or prefetch instructions
- Way prediction in set-associative cache
- Details relating to cache allocation
- Allocation of cache space to multiple users or processors
- Using a specific cache allocation policy other than replacement policy
- Details relating to cache mapping
- Way prediction in set-associative cache
- Details of cache specific to multiprocessor cache arrangements
- Coherency control relating to peripheral accessing, e.g. from DMA or I/O device
- State-only directory, i.e. not recording identity of sharing or owning nodes
- Details of virtual memory and virtual address translation
- Multi-level translation tables
- Page size control
- Page colouring
- Look-ahead translation
- Same page detection
- Address space sharing
- Virtual address space management
- Details of translation look-aside buffer [TLB]
- Multi-level TLB, e.g. microTLB and main TLB
- Multiprocessor TLB consistency
- Invalidation
- TLB miss handling
- Details relating to dynamic memory management
- Conservative garbage collection
- Details relating to flash memory management
- Logical to physical mapping or translation of blocks or pages
- Allocation control and policies
- Temporary buffering, e.g. using volatile buffer or dedicated buffer blocks
- Capacity control, e.g. partitioning, end-of-life degradation
- Cleaning, compaction, garbage collection, erase control
- Reconfiguration of flash memory system
- Management of metadata or control data

- Multiple device management, e.g. distributing data over multiple flash devices
- Validity control, e.g. using flags, time stamps or sequence numbers
- Wear leveling

Indexing scheme relating to interconnection of, or transfer of information or other signals between, memories, input/output devices or central processing units

- Serial port, e.g. RS232C
- Parallel ports, e.g. centronics
- Extension to the industry standard architecture [EISA]
- High speed serial bus, e.g. Fiber channel
- High speed serial bus, e.g. IEEE P1394
- Futurebus
- Inter-integrated circuit (I2C)
- Industry standard architecture [ISA]
- Multibus
- Peripheral component interconnect (PCI)
- PCI express
- Serial attached SCSI [SAS]
- Serial ATA [SATA]
- Sun microsystems bus [SBus]
- Small computer system interface [SCSI]
- System on Chip
- Universal serial bus [USB]
- Versatile modular eurobus [VME]
- Assignment of addresses or identifiers to the modules of a bus system
- Split transaction bus
- 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
- Bus-related hardware virtualisation
- Bandwidth consumption reduction during transfers
- Latency reduction in handling transfers
- Memory access
- Memory access type
- Interrupt
- Avoidance of interrupt starvation
- Generation of an interrupt or a group of interrupts after a predetermined number of interrupts
- Generation of an interrupt or a group of interrupts after a fixed or calculated time elapses
- Reducing the frequency of interrupts generated from peripheral to a CPU
- Dispatching of interrupt load among interrupt handlers in processor system or interrupt controller
- Routing of interrupt among interrupt handlers in processor system or interrupt controller
- Determination of the interrupt source among a plurality of incoming interrupts
- Signal interruptions by means of a message
- Sharing of interrupt line among a plurality of interrupt sources
- Interrupt packet, e.g. event
- DMA
- DMA using DMA transfer descriptors
- Systems and methods for controlling the DMA frequency on an access bus
Indexing scheme relating to security arrangements for protecting computers, components thereof, programs or data against unauthorised activity

Indexing scheme relating to additional aspects of information retrieval not explicitly covered by G06F 16/00 and subgroups

Indexing scheme relating to application aspects of data processing equipment or methods

Indexing scheme relating to security arrangements for protecting computers, components thereof, programs or data against unauthorised activity
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<th>Description</th>
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<td>2221/2133</td>
<td>Verifying human interaction, e.g., Captcha</td>
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