Preface

This technical report gives a list of US patents and patent applications related to spreadsheets. It is intended as a companion to the book *Spreadsheet Implementation Technology* [12], and extends and updates an appendix from the 2006 technical report *A Core Spreadsheet Implementation* [11].
Chapter 1

Patents and applications

This is a list of US patents (label USnnnnnnnn) and US patent applications (label USyyyyynnnnnn) in which the word “spreadsheet” appears in the title or abstract. Documents that were obviously not about spreadsheet implementation have been omitted from the list, but probably some documents remain that only use spreadsheets for some purpose. The list was created by searches of the Espacenet [8] database on 26 July 2006 and on 2 April 2018. Google Patents [4] was used for investigative work and to determine association between patents. The date shown below is the date granted for patents, and the date of submission for patent applications. The list is arranged in ascending order of this date. Unusual spelling in document titles has been preserved.

The full text of the patent documents themselves can be obtained in PDF from the European Patent Office [8] and in HTML from the US Patents and Trademarks Office [14]. In both cases, simply do a “number search” using the patent number USnnnnnnnn or the patent application number USyyyyynnnnnn.

Documents marked with an asterisk (*) are discussed in the main text. In most cases we give a brief summary of each patent or patent application below.

Disclaimer: Neither the author nor the IT University of Copenhagen nor the publisher can take any responsibility for the completeness of the list or the correctness and completeness of the summaries, nor for any legal, technical or monetary consequences of using the list and the summaries.


2. Method for assisting the operator of an interactive data processing system to enter data directly into a selected cell of a spreadsheet; US5021973; 1991-06-04. By Irene Hernandez and Beverly Machart; assigned to IBM. Type the desired contents of a cell into the cell – presumably unlike early DOS-based spreadsheets, in which the text was typed in a separate editor line above the sheet.


5. Graphic file directory and spreadsheet; US5093907; 1992-03-03. By Yao Hwong and Mitsuo Kaneko; assigned to Axa. Display and process (miniatures of) image files in a matrix of cells.

6. Method for controlling the order of editing cells in a spreadsheet by evaluating entered next cell attribute of current cell; US5121499; 1992-06-09. By Rex McCaskill and Beverly Machart; assigned to IBM. Let each cell determine which cell is “next” in editing order.


11. Method for hiding and showing spreadsheet cells; US5255356; 1993-10-19. By Eric Michelman and Devin Ben-Hur; assigned to Microsoft. Hiding or showing cells that contribute to subtotals and schematic, according to the cells’ formulas.


16. *Method of bidirectional recalculation; US5339410; 1994-08-16. By Naoki Kanai; assigned to IBM. Proposes to replace the standard unidirectional computation by bidirectional constraints. This seems to require formulas to be inverted, which isn’t possible in general.

17. Spreadsheet program which implements alternative range references; US5371675; 1994-12-06. By Irene Greif, Richard Landsman and Robert Balaban; assigned to Lotus De-
Use a menu to choose between different source cell ranges in a calculation.


19. Sorting a table by rows or columns in response to interactive prompting with a dialog box graphical icon; US5396621; 1995-03-07. By Kathryn Macgregor and Elisabeth Waymire; assigned to Claris. Choosing and indicating graphically whether sorting is by row or column.


25. Visually aging scroll bar; US5532715; 1996-07-02. By Cary Bates and others; assigned to IBM. Visually "heating" a controlled cell as long as a scrollbar slider remains the same position.

26. Graphic indexing system; US5539427; 1996-07-23. By Dan Bricklin and others; assigned to Compaq Computer. Using a lasso gesture in handwriting entry to indicate items to index. Similar to patent 51.

27. Code generation and data access system; US5544298; 1996-08-06. By Walter Kanavy and Timothy Brown; assigned to Data Management Corporation. A system to speed up the creation of database queries and the like.

28. * Method and system of sharing common formulas in a spreadsheet program and of adjusting the same to conform with editing operations; US5553215; 1996-09-03. By Richard Kaethler, assigned to Microsoft; very similar to patent 43.

29. System and methods for automated graphing of spreadsheet information; US5581678; 1996-12-03. By Philippe Kahn; assigned to Borland. Automatically proposing a graph type (pie chart, curve, 2D or 3D bar chart, . . . ) based on the number of data points and the complexity of selected data. Similar to patent 22.

30. System and methods for improved spreadsheet interface with user-familiar objects; US5590259; 1996-12-31. By Charles Anderson and others; assigned to Borland. Also published as US5416895.

between cells by storing the formatting information in a separate formatting table, and mapping cell coordinates to entries in that table.


36. Method and system for the direct manipulation of cells in an electronic spreadsheet program or the like; US5623282; 1997-04-22. By Christopher Graham, Ross Hunter and Lisa James; assigned to Borland. Appears closely related to application 102.


39. Method and system for automatically entering a data series into contiguous cells of an electronic spreadsheet program or the like; US5685001; 1997-11-04. By Brian Capson and others; assigned to Microsoft. Use mouse and/or keyboard to quickly enter series such as 1, 2, . . . ; or Monday, Tuesday, . . . , as used in Excel.


41. Method and system for linking controls with cells of a spreadsheet; US5721847; 1998-02-24. By Jeffrey Johnson; assigned to Microsoft. Associating graphic controls (a view and a controller) with spreadsheet cells (a model).

42. Method and apparatus for retrieving data and inputting retrieved data to spreadsheet including descriptive sentence input means and natural language interface means; US5734889; 1998-03-31. By Tomoharu Yamaguchi; assigned to Nippon Electric Co. Translating a natural language phrase to a database query an executing it in a spreadsheet.

43. * Method and system of sharing common formulas in a spreadsheet program and of adjusting the same to conform with editing operations; US5742835; 1998-04-21. By Richard Kaethler, assigned to Microsoft; very similar to patent 28. First, describes a technique to identify identical formulas in a contiguous block of cells, and to share a single representation of the formula between all cells in the block. The need for this presupposes a particular formula representation, which is not made explicit, but which clearly is different from that chosen in Corecalc. Second, notes that the sharing makes insertion and deletion of entire rows and columns more complicated, should they happen to intersect with a block.
This problem is discussed also in [12, Section 2.19], but the patent's solution makes a point of creating small cell blocks, distinguishing between blocks with 1 to 4, 5 to 16, and 16 or more columns; and with 1 to 15, 16 to 31, 31 to 48, and 49 to 200 rows. The point of this is not yet clear.

Maybe a faulty implementation of this approach caused bugs number KB171339 ("Some values not recalculated when using multiple formulas") and KB154134 ("Functions in filled formulas may not be recalculated") in Excel97; see Microsoft Developer Network Knowledge base at http://support.microsoft.com/kb/q174868/.


45. Computer-based system and method for data processing; US5768158; 1998-06-16. By Dan Adler, Roberto Salama and Gerald Zaks; assigned to Inventure America Inc. A spreadsheet program in which a cell may contain any object.

Piersol's 1986 paper [10] is mentioned in the application but apparently not considered prior art, because a formula cannot change the value of another cell in Piersol's system.

46. * Constraint-based spreadsheet system capable of displaying a process of execution of programs; US5799295; 1998-08-25. By Yasuo Nagai; assigned to Tokyo Shibaura Electric Co. A spreadsheet based on constraints in addition to formulas.


49. Method and apparatus for suggesting completions for a partially entered data item based on previously-entered, associated data items; US5845300; 1998-12-01. By Ross Comer, Adam Stein and David Williams Jr; assigned to Microsoft. How to propose completion of partially typed cell entries from a dynamically updated list.

50. Method and apparatus for entering and manipulating spreadsheet cell data; US5848187; 1998-12-08. By Daniel Bricklin, William Lynch and John Friend; assigned to Compaq Computer. How to read and then assign hand-written data to spreadsheet cells. Similar to patent 40.


52. Method and system for mapping non-uniform table-structure input data to a uniform cellular data structure; US5881381; 1999-03-09. By Akio Yamashita and Yuki Hayama; assigned to IBM. Pasting a table from a text document into a spreadsheet, such that each spreadsheet cell receives one table item.

53. Spreadsheet image showing data items as indirect graphical representations; US5880742; 1999-03-09. By Ramana Rao and Stuart Card; assigned to Xerox. Displaying multidimensional data graphically and manipulating the graphs in the user interface.


56. System and method of integrating a spreadsheet and external program having output data calculated automatically in response to input data from the spreadsheet; US5893123; 1999-04-06. By Paul Tuinenga. Using OLE to call an external function from a spreadsheet (when recalculating) and getting the result back into the spreadsheet.

57. Transformation of real time data into times series and filtered real time data within a spreadsheet application; US5926822; 1999-07-20. By Mark Garman; assigned to Financial Engineering. A spreadsheet program that permit real-time update of cells reflecting a stream of input values.


59. Spreadsheet-calculating system and method; US5970506; 1999-10-12. By Hiroki Kiyan, Takaki Tokuyama and Motohide Tamura; assigned to Justsystem Corporation. A cell area can be held fixed when the sheet is scrolled.

60. Method and apparatus for using label references in spreadsheet formulas; US5987481; 1999-11-16. By Eric Michelman, Joseph Barnett and Jonathan Lange; assigned to Microsoft. Using names (symbolic labels) to refer to ranges in a spreadsheet. The intersection of a row name and a column name denotes a cell.


62. Method and system for allowing multiple users to simultaneously edit a spreadsheet; US6006239; 1999-12-21. By Anil Bhansali and Rohit Wad; assigned to Microsoft. Describes a kind of concurrent versioning system for multiple users to edit and save the same spreadsheet.

63. Method and system for establishing area boundaries in computer applications; US6005573; 1999-12-21. By William Beyda and Gregory Noel; assigned to Siemens. Limiting scrolling and editing in a graphical user interface.

64. Computerized spreadsheet with auto-calculator; US6055548; 2000-04-25. By Ross Comer and David Williams Jr; assigned to Microsoft. Describes a mechanism to apply a function (such as \( \text{SUM} \)) to a selected cell area, where the user may interactively and graphically change the selection. Excel and other spreadsheet programs implement this functionality for \( \text{SUM} \) (only?), displaying the value in the status bar. Closely related to patent 87.

65. On-screen identification and manipulation of sources that an object depends upon; US6057837; 2000-05-02. By Darrin Hatakeda and others; assigned to Microsoft. Using colors to indicate the various cell areas that a formula or graph depends on. Implemented in Excel.

66. Method and system for the direct manipulation of cells in an electronic spreadsheet program or the like; US6112214; 2000-08-29. By Christopher Graham, Ross Hunter and Lisa James; assigned to Microsoft. Moving or copying a marked block of cells by dragging its border and using control keys. Implemented in Excel. Appears related to patent 36.

67. System for displaying desired portions of a spreadsheet on a display screen by adjoining the desired portions without the need for increasing the memory capacity; US6115759; 2000-09-05. By Kazumi Sugimura and Shuzo Kugimiya; assigned to Sharp. How to hide and later redisplay selected rows and columns.

68. System and method for processing data in an electronic spreadsheet in accordance with a data type; US6138130; 2000-10-24. By Dan Adler and Roberto Salama; assigned to...
Inventure Technologies. Seems related to patent 45 but additionally mentions the Java programming language.

69. Method and apparatus for organizing and processing information using a digital computer; US6166739; 2000-12-26. By Kent Lowry and others; assigned to Microsoft. Initiate cell editing by two single-clicks rather than one double-click when a spreadsheet program (Excel) runs as component in a web browser (Internet Explorer).

70. Spreadsheet view enhancement system; US6185582; 2001-02-06. By Polle Zellweger; assigned to Xerox. Related to patent 72.

71. Analytic network engine and spreadsheet interface system; US6199078; 2001-03-06. By Philip Brittan and others; assigned to Sphere Software Engineering. A calculation mechanism that attempts to handle circular cell dependencies.

72. Animated spreadsheet for dynamic display of constraint graphs; US6256649; 2001-07-03. By Jock Mackinlay and others; assigned to Xerox. Related to patent 70.

73. Multi-dimensional table data management unit and recording medium storing therein a spreadsheet program; US2001016855; 2001-08-23. By Yuko Hiroshige. Selecting and manipulating three-dimensional data.


75. Graphical environment for managing and developing applications; US6286017; 2001-09-04. By Ágúst Egilsson. An extended spreadsheet paradigm in which a spreadsheet may refer to external program fragments and the like. Closely related to patents 369 and 117.


78. Parallel execution mechanism for spreadsheets; US2001056440; 2001-12-27. By David Abramson and Paul Roe. A method for explicitly initiating a parallel computation from a spreadsheet cell; not a parallel implementation of the standard recalculation mechanism.

79. Method and system for distributing and collecting spreadsheet information; US2002010743; 2002-01-24. By Mark Ryan, David Keeney and Ronald Tanner. Assigning individual sheets of a master workbook to one or more contributors, sending copies of the sheets to the contributors for updating, and reintegrating them into the master workbook.

80. Method and apparatus for handling scenarios in spreadsheet documents; US2002055953; 2002-05-09. By Falko Tesch and Matthias Breuer. Preserving, and displaying a tree structure, the scenarios explored using a spreadsheet.

81. Method and system in an electronic spreadsheet for applying user-defined options; US2002059233; 2002-05-16. By Bauchot and Albert Harari; application by IBM. How to set options to true or false.
CHAPTER 1. PATENTS AND APPLICATIONS


84. Apparatus and method for dynamically updating a computer-implemented table and associated objects; US6411959; 2002-06-25. By Todd Kelsey; assigned to IBM. Automatically copying formulas and extending references to a table when new rows or columns are added. Much the same idea as Microsoft’s patent 107.


86. Multidimensional electronic spreadsheet system and method; US2002091728; 2002-07-11. By Henrik Kjaer and Dan Pedersen. A three-dimensional spreadsheet in which a usual cell (in the two-dimensional grid) can contain a stack of cells.

87. Computerized spreadsheet with auto-calculator; US6430584; 2002-08-06. By Ross Comer and David Williams Jr; assigned to Microsoft. Closely related to patent 64.


• System and method for vertical calculation using multiple columns in a screen display; US2002143811; 2002-10-03.
• System and method for calculation using spreadsheet lines and vertical calculations in a single document; US2002143831; 2002-10-03.
• System and method for calculation using multi-field columns with hidden fields; US2002143809; 2002-10-03.
• System and method for calculation using a calculator input mode; US2002143730; 2002-10-03.
• System and method for calculation using multi-field columns with modifiable field order; US2002143830; 2002-10-03. Unclear what is new relative to the general concept of a spreadsheet.
• System and method for calculation using formulas in number fields; US6742162; 2004-05-25.
• System and method for calculation using a subtotal function; US2004205676; 2004-10-14. Describes a graphical way to specify subtotal computations.
• System and method for calculation using vertical parentheses; US6961898; 2005-11-01.

90. Method and system for automated data manipulation in an electronic spreadsheet program or the like; US2002174141; 2002-11-21. By Shing-Ming Chen. Spreadsheet as database front-end, addressing cells with ranges and cell collections, and recording macros.
91. Multidimensional data entry in a spreadsheet; US2002184260; 2002-12-05. By Paul Martin, William Angold, and Nicolaas Kichenbrand. Accessing, displaying, editing and writing back multidimensional data, as obtained from a relational database. Closely related to application 93.

92. Visualization spreadsheet; US6496832; 2002-12-17. By Ed Chi and others. The authors and the patent seem unrelated to Nuñez [7], but the general idea is the same.


94. Method and apparatus for entry and editing of spreadsheet formulas; US2003033329; 2003-02-13. By Eric Bergman and Paul Rank. Terminate the editing of a formula on a PDA when user selects a different cell while the cursor in the formula is at a point inappropriate for insertion of a cell reference.

95. Spreadsheet recalculation engine version stamp; US6523167; 2003-02-18. By Timothy Ahlers and Andrew Becker, assigned to Microsoft. Explains how recalculation – or not – at loading can be controlled by calculation engine version stamp. This technique appears to be used in Excel 2000 and later to enforce a full recalculation when loading a workbook that was last saved by Excel'97 or older, and avoid that recalculation otherwise. (Maybe the intention is to guard against an Excel'97 recalculation flaw; see note under patent 43).

96. System and method for displaying spreadsheet cell formulas in two dimensional mathematical notation; US2003056181; 2003-03-20. By Sharad Marathe. Displaying spreadsheet formulas in usual mathematical notation. This would seem to be what symbolic mathematics programs such as Maple and Mathematica routinely perform.

97. System and method for editing a spreadsheet via an improved editing and cell selection model; US6549878; 2003-04-15.


99. Individually locked cells on a spreadsheet; US2003117447; 2003-06-26. By Gayle Mujica and Michelle Miller; application possibly by Texas Instruments. Allow individual locking of cells (instead of bulk locking and individual unlocking as in Excel), and graphical marking of locked cells.


102. Method and system for the direct manipulation of cells in an electronic spreadsheet program or the like; US2003164817; 2003-09-04. By Christopher Graham, Ross Hunter and Lisa James; application by Microsoft. Describes how keys and mouse can be used to control whether insertion of cell blocks overwrite cells or add new rows and columns. Implemented in Excel. Appears closely related to patent 36.

103. Interface for an electronic spreadsheet and a database management system; US2003182287; 2003-09-25. By Carlo Parlanti. Accessing relational databases from a spreadsheet with ODBC and UDA.
CHAPTER 1. PATENTS AND APPLICATIONS

104. Automatic formatting of pivot table reports within a spreadsheet; US6626959; 2003-09-30. By Wesner Moise, Thomas Conlon and Michelle Thompson; assigned to Microsoft. The automatic formatting of finished pivot tables as known from Excel.

105. System and method in an electronic spreadsheet for displaying and/or hiding range of cells; US2003188258; 2003-10-02. Much the same as patent 225.

106. Binding data from data source to cells in a spreadsheet; US6631497; 2003-10-07. By Ardeshir Jamshidi, Farzad Farahbod and Hardeep Singh; assigned to IBM. Dynamically importing data from external sources (such as databases), with no need for programming.

107. Extension of formulas and formatting in an electronic spreadsheet; US6640234; 2003-10-28. By Wayne Coffen and others; assigned to Microsoft. Describes a system by which a previously blank but newly edited cell, which extends a list of consistently typed and formatted cells, will automatically be formatted like those cells and will be included in existing formulas and aggregating expressions that include all of those cells. Closely related to patent 197.


109. Method in connection with a spreadsheet program; US2003226105; 2003-12-04. By Mattias Waldau. Describes cross-compilation to another platform, such as a mobile phone or web service. This is a technically substantial patent with references to relevant prior art, such as Schlafly's patents. It describes compilation to dynamically typed and statically typed languages (JavaScript and Java), and how to present the generated code as a WML service, say. Probably the technology described by this application is that used in the SpreadsheetConverter product [3].

110. Binding spreadsheet cells to objects; US6701485; 2004-03-02. By Mark Igra, Eric Matteson and Andrew Milton; assigned to Microsoft. Binding a spreadsheet cell to an external event source, such as a stock ticker, for instance when a spreadsheet program (Excel) runs as component in a web browser (Internet Explorer).

111. Data-bidirectional spreadsheet; US2004044954; 2004-03-04. By Michael Hosea; application possibly by Texas Instruments. Interfacing a spreadsheet program to an external calculation engine, as in an electronic graphical pocket calculator.


113. Method and system in an electronic spreadsheet for introducing new elements in a cell named range according to different modes; US6725422; 2004-04-20. By Frederic Bauchot and Albert Harari; assigned to IBM. Differentiating between closed and open named ranges of cells; the latter can be expanded by insertion of new rows and columns in the open direction.

114. System and method for automated data extraction, manipulation and charting; US2004080514; 2004-04-29. By Richard Dorwart. Automatically creating appropriate charts from tabular spreadsheet data, and exporting the charts to a presentation program.

in a spreadsheet program, so that a query can create and populate a new worksheet, containing appropriately copied and adjusted formulas.


118. * Methodology for testing spreadsheet grids; US6766509; 2004-07-20. By Andrei Shretov, Margaret Burnett and Gregg Rothermel; assigned to University of Oregon. Two methods for using du-associations to test spreadsheets; in the more advanced method, the testing of a single representative cell can increase the testedness of a range of cells containing similar formulas.


120. Storing objects in a spreadsheet; US6779151; 2004-08-17. By Jason Cahill and Jason Allen; assigned to Microsoft. Very similar to patent 157.

121. Thin client framework deployment of spreadsheet applications in a web browser based environment; US2004181748; 2004-09-16. By Ardeshr Jamshidi and Hardeep Singh; application by IBM. Client and server collaborating to support a browser-based spreadsheet program.


123. System and method for generating an executable procedure; US2005028136; 2005-02-03. By Ronald Woodley. Generating C++ (or other) source code, where the code generation is controlled by data stored in a spreadsheet; not about generating code from spreadsheet formulas.


126. Method and system for handling data available in multidimensional databases using a spreadsheet; US2005091206; 2005-04-28. By Francois Koukerdjinian and Jean-Philippe Jauffret. Extracting data from a database to create a local database, from which a spreadsheet can then draw its data.


129. Method and system in an electronic spreadsheet for persistently copy-pasting a source range of cells onto one or more destination ranges of cells; US6912690; 2005-06-28.
CHAPTER 1. PATENTS AND APPLICATIONS

By Frederic Bauchot; application by IBM. Mechanism to make persistent copies of a formula, so that the copies are automatically updated when the original is updated. Closely related to patent 276. This seems similar to Montigel's Wizcell [6].

130. Method of updating a database created with a spreadsheet program; US2005149482; 2005-07-07. By Patrick Dillon; application by Thales. Ensuring the correctness of database updates performed from a spreadsheet.

131. System and method for schemaless data mapping with nested tables; US2005172217; 2005-08-04. By Yiu-Ming Leung; application possibly by Microsoft. Handling and displaying nested tables of data, as from an XML document, without the need for a predetermined schema or XML map. Closely related to patent 199.


133. Clipboard content and document metadata collection; US2005203935; 2005-09-15. By James McArdle; application by IBM. An enhanced clipboard collects information about the source of clippings (date, time, source document, URL, or the like) so that such metadata can be saved in the target document along with the pasted text or data.

134. * Methodology for testing spreadsheets; US6948154; 2005-09-20. By Gregg Rothermel, Margaret Burnett, and Lixin Li; assigned to University of Oregon. Using du-associations to gradually test a spreadsheet, displaying each cell's testedness.

135. Methods of updating spreadsheets; US2005210369; 2005-09-22. By John Damm. How to update a cell by tapping on it and/or selecting from a drop-down list, intended for PDAs.

136. Code assist for non-free-form programming; US2005240984; 2005-10-27. By George Farr and David McKnight; application by IBM. Suggesting completions while typing data into a spreadsheet or similar.

137. Method and apparatus for viewing and interacting with a spreadsheet from within a web browser; US2005268215; 2005-12-01. By Daniel Battagin and Yariv Ben-Tovim; application by Microsoft. Using server-side scripts and a server-side spreadsheet engine to generate HTML, possibly with scripts for inactivity, that when displayed in a client-side browser will provide a spreadsheet user interface.


141. Client side, web-based spreadsheet; US6988241; 2006-01-17. By Steven Guttmann and Joseph Ternasky; assigned to IBM. Describes a spreadsheet that can be run in a browser, permitting people collaborate and share spreadsheets on the web, and permitting the sheet to use real-time data from the web (such as stock quotes). How similar is Google's recently announced web-based spreadsheet to this?

143. Method and apparatus for integrating a list of selected data entries into a spreadsheet; US2006026137; 2006-02-02. By Juergen Sattler and others. Appears related to application 139.

144. Dynamic data display having slide drawer windowing; US7000181; 2006-02-14. By Robert Press; application by IBM. A graphical display of data in which multiple "drawers", each displaying a fragment of a spreadsheet, may be visible simultaneously, and may automatically resize themselves.

145. Support for user-specified spreadsheet functions; US2006036939; 2006-02-16. Craig Hobbs and Daniel Clay; application by Microsoft. Permits a user to define a function with named parameters in a spreadsheet cell and call it from other cells. Calls have the syntax \( F(funcell, \text{"argname"}, \text{arg1}, \ldots, \text{"argNname"}, \text{argN}) \). Within the function cell, an argument is referred to using the expression \( R("argname") \).


147. Graphically defining a formula for use within a spreadsheet program; US2006053363; 2006-03-09. By Christopher Bargh, Gregory Johnston and Russell Jones. How to call a function defined using an external graphical tool.

148. Two pass calculation to optimize formula calculations for a spreadsheet; US2006085386; 2006-04-20. By Lakshmi Thanu, Peter Eberhardt and Xiaohong Yang; application by Microsoft. How to efficiently access external data such as relational databases for OLAP queries and similar.


154. System and method for a spreadsheet application supporting diverse formulaic functions; US8726143; 2006-07-20. By Roy Simkhay and others; application by Microsoft. Defines various spreadsheet functions, e.g. \( \text{IFERROR}, \text{COUNTIFS}, \text{FILTER}, \text{DISTINCT} \). Closely related to patent 463.


156. Importing and exporting markup language data in a spreadsheet application document; US7640493; 2006-08-24. By Robert Collie and others; application by Microsoft.
Uses mapping between cell references and XML elements for import and export of spreadsheets.

157. Storing objects in a spreadsheet; US7099890; 2006-08-29. By Jason Cahill and Jason Allen; application by Microsoft. A mechanism to store general objects (in addition to numbers, texts and errors) in spreadsheet cells, and to invoke methods on them from other cells. The objects may be external and the method calls performed using COM, so this is probably a generalization of Piersol [10] and Nuñez [7]. Very similar to patent 120.

158. Spreadsheet-based user interface creation; US7107519; 2006-09-12. By Steven Webster and others; application by Cognex. Defines methods for creating GUIs in a spreadsheet.

159. Method and system to associate cell and item metadata; US7693860; 2006-09-21. By Alexander Babanov and others; application by Microsoft. Storing metadata about cells and cell contents, like cell names and units.


161. Spreadsheet programming; US2006224946; 2006-10-05. By Robert Barrett and others; application by IBM. Imperative programming for spreadsheets. Cell expressions can be code blocks and evaluate to objects, whose fields and methods are accessible from other cells. Defines event based execution model for such code block cells.

162. Scrollable and re-sizeable formula bar; US7590944; 2006-10-05. By Brandon Weber and Charles Ellis; application by Microsoft. Visualizing long expressions in GUI.


165. System and method for exporting spreadsheet data; US2006248443; 2006-11-02. By Ramin Bagheri; application by SAP. Exporting database contents to a spreadsheet.

166. Method and system in an electronic spreadsheet for handling absolute references in a copy/cut and paste operation according to different modes; US7143338; 2006-11-28. By Frederic Bauchot and Albert Harari; application by IBM. Describes a method and conditions for replacing absolute cell references to the source range by (other) absolute cell references in the target range when copying formulas.

167. Method and system in an electronic spreadsheet for comparing series of cells; US7146561; 2006-12-05. By Bauchot and Daniel Mauduit; application by IBM. Use Boolean functions to determine whether two ranges of cells overlap, are disjoint, are equal or are contained one in the other.

168. Interactive formula builder; US2006282818; 2006-12-14. By Stuart Despain; application by Microsoft. UI for building formulas suggesting functions, visualizing referenced cells etc.

169. Pre-formulated spreadsheet cell groups; US7424668; 2006-12-21. By Stuart Despain; application by Microsoft. Presenting templates for invoicing, tracking bills etc., with relevant formulas already present, in spreadsheet UI.

171. Method for creating an embedded database in a spreadsheet; US7155665; 2006-12-26. By Kevin Browne and others; application by Microsoft. UI for creating lists with row-wise database functionality over a range of cells or imported data.


175. Structuring data for spreadsheet documents; US2007022128; 2007-01-25. By Chad Rothschilder and others; application by Microsoft. Modular file format for spreadsheets (code module, shared strings module, module for each sheet etc.).


177. Method and system for the graphical modeling of data and calculations of a spreadsheet; US7984371; 2007-02-08. By Andrew Zdenek. UI visualizing abstract syntax tree of a formula.

178. Method and system in an electronic spreadsheet for handling user-defined options in a copy/cut - paste operation; US7178098; 2007-02-13. By Bauchot and Albert Harari; application by IBM. How to control the setting of user-defined options in a cell copying operation, when the options were set for the source range of cells.


180. Integrated spreadsheet expanding table with collapsable columns; US2007050697; 2007-03-01. By Alister Lewis-Bowen and Louis Weitzman; application by IBM. GUI collapses columns and/or rows with same value.


183. Formattable spreadsheet table elements with automatic updating; US2007050700; 2007-03-01. By Roy Simkhay and others; application by Microsoft. Multiple cells can be formatted as one.


186. Automatic report generation; US2007055688; 2007-03-08. By Donald Blattner; application by IBM. Map spreadsheet to data for translation to (and from?) reports.
187. Autocompleting with queries to a database; US8234293; 2007-03-08. By Alexander Martynov and others; application by Microsoft. Autocomplete partial data-entries based upon predefined coordinates, operands and/or commands.

188. Compile-time optimizations of queries with SQL spreadsheet; US7809712; 2007-03-08. By Andrew Witkowski and others; application by Oracle. Closely related to patents 179 and 355.

189. Designating, setting and discovering parameters for spreadsheet documents; US7752536; 2007-03-15. By Eran Megiddo and others; application by Microsoft. Using cells as parameters for spreadsheet functionality, such as expressing a cell range to lock.


191. Converting structured reports to formulas; US7792847; 2007-03-15. By Howard Dickerman and others; application by Microsoft. Structured, multidimensional spreadsheet reports are converted to spreadsheets with no dependency on the original report.

192. System, method and computer program product to populate data into spreadsheets and execute functions and programs within the same; US7197696; 2007-03-27. By Pavan Muzumdar. Data from a database and a spreadsheet template is used to create a spreadsheet report of the data.


194. System and method for generating a bill of material file; US2007073679; 2007-03-29. By Chang-Wen Fu and others. Storing a BOM file as a spreadsheet and checking requirements in the spreadsheet.

195. Apparatus and method for parsing unstructured data; US7792814; 2007-04-05. By Ronen Cohen; application by SAP. Using regular expressions to find patterns in unstructured data, which can be turned into a spreadsheet.

196. Method and system in an electronic spreadsheet for adding or removing elements from a cell named range according to different modes; US6757867; 2007-04-17. By Frederic Bauchot and Albert Harari; application by IBM. Mechanism for updating referring formulas when rows or columns are added to or deleted from a cell range.


198. Data source write back and offline data editing and storage in a spreadsheet; US7225189; 2007-05-29. By Michael McCormack and others; application by Microsoft. Synchronizing between spreadsheet and database, caching changes when disconnected.


200. Systems and methods providing dynamic spreadsheet functionality; US8275974; 2007-06-07. By Perlie Voshell; application by Outlooksoft. Defines new built-ins for importing and creating reports from external database. Added built-ins are also used to specify properties of reports. Closely related to patent 155.

201. System and method for managing a spreadsheet; US7231593; 2007-06-12. By Ramkumar Raja and others; application by Balenz Software. Closely related to patent 234 and
202. Spreadsheet cell-based notifications; US9501463; 2007-06-14. By Dan Khen and others; application by Microsoft. Integrating spreadsheets into workflows, exactly like US7908549, but allowing for e.g. email notifications.


204. Spreadsheet calculation as part of workflow; US7908549; 2007-06-14. By Dan Khen and others; application by Microsoft. Integrating spreadsheets into workflows, allowing e.g. actions to be performed depending on cell-value thresholds.


207. Method and apparatus for data; US7233956; 2007-06-19. By Corrado Balducci and others; application by IBM. Transforming a spreadsheet into server-side components (such as Java servlets) that generate HTML for spreadsheet display in a browser at client-side.

208. System and method for editing a spreadsheet via an improved editing and cell selection model; US7237186; 2007-06-26. By Matthew Androski and others; application by Microsoft. Detailed description of editing gestures in a spreadsheet program.


213. Custom summary views for screen reader; US9818313; 2007-07-19. By Eric Damery and others; application by Freedom Scientific. Using cell range labeling for screen reader functionality (e.g. text to speech or braille support).


CHAPTER 1. PATENTS AND APPLICATIONS

Processing and using XML maps and XML schemas in a spreadsheet program.


218. Systems, methods, and media for processing a spreadsheet for storage in a database; US2007185935; 2007-08-09. By Ricardo Olivieri and Mark Whelan. Passing spreadsheet data to back end application for processing or database storage.

219. System and method for rendering data; US7917841; 2007-08-16. By Stefan Chopin and others; application by Edgar Online. Analyse and categorize sentences in a text document to find and import financial data into a spreadsheet. Closely related to patent 386.

220. User defined spreadsheet functions; US7266763; 2007-09-04. By Simon Peyton Jones, Alan Blackwell and Margaret Burnett; application by Microsoft. Describes the concepts presented also in their paper [9].

221. Method and system in an electronic spreadsheet for managing and handling user-defined options; US7272783; 2007-09-18. By Bauchot and Albert Harari; application by IBM. How to create or change user-defined options using a table.

222. Excel spreadsheet parsing to share cells, formulas, tables, etc.; US200719956; 2007-09-20. By Michael Milton. Spreadsheets are saved and sent to a library. The library can be searched for spreadsheets objects which can be modified after being downloaded.

223. Excel spreadsheet parsing to share cells, formulas, tables or entire spreadsheets across an enterprise with other users; US2007220415; 2007-09-20. By Morgan Cheng and others. Closely related to application 222.

224. System and method for performing processing, such as spreadsheet processing; US7783966; 2007-09-20. By Kinichi Mitsui; application by IBM. Spreadsheet gets data from external sources and recomputes when data is updated.


227. Using a spreadsheet engine as a server-side calculation model; US8082489; 2007-10-25. By Xin Jiang; application by Oracle. Transform a spreadsheet into a program that can run outside of the sheet. This program can be hosted on a server, making the functionality of the spreadsheet available.


230. Multi-thread spreadsheet processing with dependency levels; US8032821; 2007-11-08. By Jeffrey Duzak and others; application by Microsoft. Formulas are divided into dependency levels wherein each formulas of a level only depends on formulas of prior levels. This is seemingly detected by starting with a single calculation chain and then reordering the chain based on dependencies. Claim 1 seems like the best description.
231. Client side, web-based calculator; US7296219; 2007-11-13. By Steve Guttman and Joseph Ternasky; application by IBM. Create an calculator mode where some cells are non-editable. This calculator can be embedded in a website.

232. Spreadsheet to SQL translation; US7299223; 2007-11-20. By Aman Naimat and others; application by Oracle. A form of query-by-example, where a model is developed on sample database data within a spreadsheet program. Then the spreadsheet model is compiled into SQL queries that can be run on the entire database, possibly through a web interface.


235. System and method for cross attribute analysis and manipulation in online analytical processing (OLAP) and multi-dimensional planning applications by dimension splitting; US7305408; 2007-12-04. By Richard Morris; application by Retek. Manipulating and displaying hierarchical multi-dimensional data.

236. Method and system for formulaically bounding data in a spreadsheet; US7318192; 2008-01-08. By Craig Hobbs and others; application by Microsoft. Bounding values that may be entered into a cell.


238. Adapting a spreadsheet for use with a complex object; US8656271; 2008-01-31. By Julien Vayssiere and others; application by SAP. Storing "complex" objects in cells that may be a process that creates a new complex object. Seemingly a complex object is an XML-object, but it is formulated mostly in terms of code.


243. User interface for integrated spreadsheets and word processing tables; US7350141; 2008-03-25. By Matthew Kotler and others; application by Microsoft. Closely related to patents 284, 294, 284, 335, 251 and 170.

244. Dynamically merging columns within a table; US2008104498; 2008-05-01. By Mark Molander and Frank Jania, application by IBM. Combine columns through GUI. If a user wants column $C=A+B\times100$ then this can be done through GUI.

245. Methods and apparatus for generating a spreadsheet report template; US7370271; 2008-05-06. By Brian Killen and others; application by Actuate. Extracting data from a relational database and creating reports in a spreadsheet program.
Automatically creating a relational database from a spreadsheet; US2008126395; 2008-05-29. By Amichai Marueli; application by Ocyrhoe Technologies. Export a spreadsheet as a relational database.

Spreadsheet in-cell graphical display method; US2008148140; 2008-06-19. By Kimiyasu Nakano. In-cell graphics. E.g. 80% may be represented as a 80% bar.

Method and system in an electronic spreadsheet for handling graphical objects referring to working ranges of cells in a copy/cut and paste operation; US7392478; 2008-06-24. By Jean-Jacques Aureglia, Frederic Bauchot and Catherine Soler; application possibly by IBM. Extended mechanism for copying and pasting a range of cells and graphical objects.

Digital spreadsheet formula automation; US2008168341; 2008-07-10. By Raymond Payette. Given a recognized formula name the system recognizes/guesses named cells that should be used as parameters for the formula.

Cyclical and synchronized multi-source spreadsheet imports and exports; US8140958; 2008-08-07. By Andrew Garrett and others; application by IBM. Method for synchronizing spreadsheets with each other.

User interface for integrated spreadsheets and word processing tables; US7412645; 2008-08-12. By Matthew Kotler and others; application by Microsoft. General table architecture providing spreadsheet functionality (formulas, recalculation and so on) also within word processors and other programs, and permitting nested tables. Closely related to patents 284, 294, 284, 335, 243 and 170.

Mapping raw spreadsheet data into graphs on arbitrary subsets of the data; US8301993; 2008-08-14. By Moshe Matsa and Eric Perkins; application by IBM. Creating a graph (data plot) from data by first selecting whether data series follows rows or columns and then by selecting concrete rows/columns.

Use of temporary optimized settings to reduce cycle time of automatically created spreadsheets; US8904340; 2008-08-14. By Scott Hicks and others; application by IBM. Closely related to patent 485.


Method and implementation for referencing of dynamic data within spreadsheet formulas; US7415481; 2008-08-19. By Andrew Becker and others; application by Microsoft. Notation for referring to tables by symbolic name in spreadsheets, as well as parts of tables and data computed from tables. Related to patent 344.

Method and system for enabling undo across object model modifications; US7418460; 2008-08-26. By Lakshmi Thanu, Peter Eberhardt and Vijay Baliga; application by Microsoft. Improved undo mechanism using two stacks of acts.

Method, system and program product for defining imports into and exports out from a database system using spread sheets by use of a control language; US9058370; 2008-08-28. By Andrew Garrett and others; application by IBM. On import/export from databases, cells may be used as parameters for the operations providing information such as source field, destination field, or formatting information. The operation is done by a “linker”; seemingly an external program.


260. Method and system for decomposing a spreadsheet; US2008222507; 2008-09-11. By Huy Nguyen and others. Decomposing, via GUI, spreadsheet parts that can be stored in a database. Closely related to application 261.


263. Embedded spreadsheet commands; US7426688; 2008-09-16. By Bill Serra, Salil Pradhan and Antoni Drudis; application by Hewlett-Packard. Store commands in the comment fields of spreadsheet cells, and interpreting those commands as ties to external events, thus making the spreadsheet update itself – for instance, when a signal from an RFID device indicates that an item has been moved.

264. Advanced spreadsheet cell navigation; US8321780; 2008-10-02. By Martin Erwig and others; application by Redrover Software. Identifying often used cells and provides an easy access to these.

265. Apparatus and method for generating spreadsheet function source code for use in a source code application; US7840889; 2008-10-02. By Brian Mantuano and others; application by Business Objects Sa. A spreadsheet with designated input cells can be translated to source code for use by other programs. This is a compilation of an entire spreadsheet.

266. System for financial documentation conversion; US8099370; 2008-10-09. By Michael Ohata; application by Microsoft. Convert a spreadsheet into the financial format XBRL.


269. Spreadsheet rotating cell object; US2008276161; 2008-11-06. By James Slavens. A cell is defined to be able to contain a range of values. The user can cycle through these while the GUI provides a rotation animation.


271. Sending a range; US7454471; 2008-11-18. By Terri Sorge and others; application by Microsoft. Facility in a spreadsheet program to extract data from a spreadsheet, format it and automatically send it by email to an indicated recipient.

272. Authenticity assurance system for spreadsheet data; US2008294903; 2008-11-27. By Kunihiko Miyazaki and Yasuo Hatano. Authentication-system for spreadsheets on a cell level. The system allows for signatures to be verified even after a cell is redacted.

273. Digital paper-enabled spreadsheet systems; US2008301542; 2008-12-04. By David McGee and others. Spreadsheet that can receive input from a digital pen.
274. Reporting status of external references in a spreadsheet without updating; US7467148; 2008-12-16. By Jesse Bedford and others; application by Microsoft. Describes how to check existence of external workbooks and post on before attempting to update links to them. Closely related to patents 303 and 127.

275. System and method in an electronic spreadsheet for copying and posting displayed elements of a range of cells; US7467350; 2008-12-16. By Jean-Jacques Aureglia and Frederic Bauchot; application by IBM. Cell copy-and-paste in a multi-dimensional spreadsheet when some cells of the source region are hidden. Closely related to application 293.

276. Method and system in an electronic spreadsheet for persistently self-replicating multiple ranges of cells through a copy-paste operation; US7472339; 2008-12-30. By Frederic Bauchot; application by IBM. Closely related to patent 129.

277. Managing extensible value types in spreadsheet cells; US2009006466; 2009-01-01. By Charles Ellis and others; application by Microsoft. User-defined types and functions that can manipulate that type. These types are not managed in cells but by GUI.

278. Task-specific spreadsheet worksheets; US2009006939; 2009-01-01. By Stuart Despain and others; application by Microsoft. A user may select a task specific spreadsheet template, e.g. household budget, that has limited but specific functionality.

279. System and method for formatting source text files to be imported into a spreadsheet file; US7484170; 2009-01-27. By Jean-Luc Collet, Jean-Christophe Mestres and Carole Truntschka; application by IBM. Using a file format profile to guide the import of text files into a spreadsheet program.

280. System in a spreadsheet for exporting-importing the content of input cells from a scalable template instance to another; US8006174; 2009-01-29. By Jean-Jacques Aureglia and Frederic Bauchot; application by IBM. Closely related to patent 254.

281. System in an electronic spreadsheet for persistently self-replicating multiple ranges of cells through a copy-paste operation and a self-replication table; US8250461; 2009-02-05. By Frederic Bauchot; application by IBM. A cell is self-replicating if it was, or inferred to could have been, constructed through a copy-paste operation from another cell. When a cell in a self-replicating range is changed, all of the cells are automatically updated.


283. Calendar and spreadsheet user interfaces; US2009063947; 2009-03-05. By Donna Anderson; application by DMA INK. Method for printing spreadsheet.

284. System and method for integrating spreadsheets and word processing tables; US7506242; 2009-03-17. By Matthew Kotler and others; application by Microsoft. Closely related to patents 306, 284, 335, 243 and 251.


286. Method and apparatus for a file format for storing spreadsheets compactly; US7509571; 2009-03-24. By Paul Rank and others. Storing a spreadsheet on a PDA in a number of database records.

287. System and method for optimizing information display in spreadsheets and tables; US2009083614; 2009-03-26. By Gerald Wedekind; application by Xerox. Column widths are determined by optimization techniques such as simulated annealing.

289. System and method for facilitating user input by providing dynamically generated completion information; US7512654; 2009-03-31. By John Tafoya and others; application by Microsoft. Dynamic input completion based on multiple data sources such as sent and received emails, text documents and other spreadsheet files. Closely related to application 138.

290. Spreadsheet workbook part libraries; US2009089067; 2009-04-02. By Johnny Campbell and others; application by Microsoft. Divide workbooks into separate parts that can be stored on a file-system, while dependencies across the parts are maintained.


292. Auto-generation and syndication of tables as forms; US2009089653; 2009-04-02. By John Campbell and others; application by Microsoft. An input form is automatically generated from a table.


294. Spreadsheet fields in text; US7523390; 2009-04-21 By Matthew Kotler and others; application by Microsoft. Provide individual text elements, such as a text field in an HTML forms, to have spreadsheet functionality: formulas, references to other text elements, and recalculation. Closely related to patents 163, 346 and 288.


296. Spreadsheet collaboration between rich and browser clients; US7756824; 2009-04-30. By Johnny Campbell and others; application by Microsoft. Method for multiple clients working on the same spreadsheet. This is handled by a host machine that handles individual updates with techniques for handling simultaneous events.

297. Private views of data and local calculations during real time collaboration; US8190987; 2009-04-30. By Johnny Campbell and others; application by Microsoft. In a collaborative spreadsheet system it is determined which computations can be performed locally since they are deterministic. Closely related to patent 411.

298. Calculation of spreadsheet data; US8006175; 2009-04-30. By Sanjay Kulkarni and others; application by Microsoft. A large spreadsheet can be calculated on a remote computer cluster, with the potential of using parallelism with some non-described method.


301. Method and system for transferring data from a scanned document into a spreadsheet; US9753908; 2009-05-07. By David Gitlin and others; application by Digital Business Processes.
CHAPTER 1. PATENTS AND APPLICATIONS

302. Method and system for multithread processing of spreadsheet chain calculations; US7533139; 2009-05-12. By Bruce Jones and others; assigned to by Microsoft. Describes multiprocessor recalculation of spreadsheet formulas, and by the way, also describes a uniprocessor implementation, probably similar to that of Excel.

303. Reporting status of external references in a spreadsheet without updating; US7546521; 2009-06-09. By Jesse Bedford and others; application by Microsoft. Closely related to patents 274 and 127.

304. System and method in an electronic spreadsheet for displaying and/or hiding range of cells; US7546523; 2009-06-09. Much the same as patent 225.

305. Worldwide number format for a spreadsheet program module; US7549117; 2009-06-16. By Marise Chan and others; application by Microsoft. Using locale metadata to control the conversion from a numeric time value (as used in spreadsheet programs) to a displayed date appropriate for the user: month names, weekday names, Gregorian or non-Gregorian calendar, and so on.

306. System and method for integrated spreadsheets and word processing tables; US7549115; 2009-06-16. By Matthew Kotler and others; application by Microsoft. Closely related to patents 284, 284, 335, 243 and 251.


310. Multi-threaded codeless user-defined functions; US2009172063; 2009-07-02. By Joseph Chirilov and others; application by Microsoft. User-defined functions can be executed in parallel. "Codeless" seemingly refers to the fact that the user-defined functions are sheet-defined functions.

311. Spreadsheet software services; US8812950; 2009-07-02. By Vishal Sikka and Shai Agassi; application by SAP. Spreadsheet service that can analyse a spreadsheet to extract an output schema. The service makes the functionality of the spreadsheet accessible over the network.

312. Method, system, and computer-readable medium for determining whether to reproduce chart images calculated from a workbook; US7581168; 2009-08-25. By Sean Boon, application by Microsoft. Using a hash value of data to avoid re-creating a chart when data are unchanged.

313. Dynamic formulas for spreadsheet cells; US2009228776; 2009-09-10. By Allan Folting and others; application by Microsoft. Multiple formulas can be associated to a base formula, if the base formula is updated so is the associated formulas.

314. Method, system, and apparatus for providing access to workbook models through remote function calls; US8578399; 2009-09-17. By Dan Khen and others; application by Microsoft. Closely related to patents 152 and 416.

315. Embedded ad hoc browser web to spreadsheet conversion control; US7594165; 2009-09-22. By Yen-Fu Chen, John Handy-Bosma and Keith Walker. A web browser plug-in that allows any displayed HTML table to be turned into a spreadsheet component.
27

316. Functions acting on arbitrary geometric paths; US7612776; 2009-11-03. By Craig Hobbs; application by Microsoft. Functions for a spreadsheet component used to calculate and transform graphical objects as in Microsoft Visio.

317. Automated offloading of user-defined functions to a high performance computing system; US8108466; 2009-11-05. By Chris Rae and others; application by Microsoft. If a UDF is marked as safe it can be computed over a network on a high performance computing system.


320. Process for obtaining a result between a first numerical value and a second numerical value which are separated by a common character in a spreadsheet; US2009282326; 2009-11-12. By Carlos Espinosa-Montalvo. As title, e.g. 4??5 == true; 5??4 == false.


322. Spreadsheet formula translation of server calculation rules; US8527865; 2009-11-26. By Baomin Li and others; application by Microsoft. On a client-server system where calculations are performed and saved on the server, some of these calculations can be expressed as formulas which can be calculated client side for better performance.

323. Micro browser spreadsheet viewer; US2009313537; 2009-12-17. By Tsui-Ying Fu and others; application by Microsoft. Closely related to application 488.

324. Systems and methods to automatically replace content in a range of spreadsheet cells with information from a database; US2009319542; 2009-12-24. By Pierre Le Brazidec and Florent Migeon. Automatically fill in cells with data from database depending on content of surrounding cells.

325. Systems and methods to dynamically recognize a database member identifier entered into a spreadsheet cell; US8145990; 2009-12-24. By Pierre Le Brazidec and Florent Migeon; application by SAP. When a user enters a field name it may dynamically be recognized as a database identifier. This is within a framework to import/export data to/from spreadsheets.

326. Utilizing spreadsheet references with grouped aggregate views; US8158517; 2009-12-24. By Robert Collie and others; application by Microsoft. Making references and calculations work with pivot tables.

327. Method, system, and computer-readable medium for controlling the calculation of volatile functions in a spreadsheet; US7640490; 2009-12-29. By Sean Boon, application by Microsoft. How to use time stamps to mostly avoid needless recalculation of volatile functions that vary only slowly, such as TODAY().

328. Methods and systems for inputting data into spreadsheet documents; US7640489; 2009-12-29. By Matthias Breuer. User input, undo and recalculation based on previous value.

CHAPTER 1. PATENTS AND APPLICATIONS

330. Method and system for creating graphical and interactive representations of input and output data; US7650576; 2010-01-19. By Santiago Becerra. Controlling input to spreadsheet cells, and displaying output from them, using graphical components such as charts, sliders, and so on. This was proposed also by Piersol [10] and Nuñez [7].


- Spreadsheet risk reconnaissance network for automatically detecting risk conditions in spreadsheet documents within an organization using principles of objective-relative risk analysis; US2010049723; 2010-02-25.
- Method of computing spreadsheet risk within a spreadsheet risk reconnaissance network employing a research agent installed on one or more spreadsheet file servers; US2010049565; 2010-02-25.
- Method of implementing an organization's policy on spreadsheet documents monitored using a spreadsheet risk reconnaissance network; US2010049745; 2010-02-25.
- Method of classifying spreadsheet files managed within a spreadsheet risk reconnaissance network; US2010049746; 2010-02-25.
- Method of inspecting spreadsheet files managed within a spreadsheet risk reconnaissance network; US2010050230; 2010-02-25.
- Spreadsheet risk reconnaissance network for automatically detecting risk conditions in spreadsheet files within an organization; US2010050264; 2010-02-25.

Spreadsheet risk analysis determining the likelihood of an error in a spreadsheet and the impact of such an error.

333. Error correction mechanisms in spreadsheet packages; US7665013; 2010-02-16. By Stephen Todd; application by IBM. Introduces pairs of a referencing array and a bound array. If a cell within a referencing array refers to some cell outside the corresponding bound array, an error is signaled.

334. Method, system, and apparatus for exposing workbook ranges as data sources; US7664804; 2010-02-16. By Amir Netz and others; application by Microsoft. Accessing parts of a spreadsheet document using the same interface (such as ODBC) as for a database.

335. User interface for integrated spreadsheets and word processing tables; US7673227; 2010-03-02. By Matthew Kotler and others; application by Microsoft. Closely related to patents 284, 294, 284, 243, 251 and 170.


337. Formula display and search; US9037959; 2010-04-01. By Peter Rapp and others; application by Apple. Displaying cell formulas, cell results, and cell addresses of a spreadsheet in a single searchable list.

338. Locking spreadsheet cells; US9223771; 2010-04-01. By Matthew Lehrian and others; application by Apple. Variant of cell freezing (e.g. in Microsoft Excel) where frozen cells may disappear when scrolling far enough.


341. Context sensitive computations; US2010083090; 2010-04-01. By Michael Coblenz and others; application by Apple. Semantics sensitive to cell formatting (e.g. dates and durations).

342. Dynamic text escaping; US2010083091; 2010-04-01. By Peter Berger and Lynn Abell; application by Apple. Determining whether or not to treat special characters (e.g. tab and newline) as plain text.

343. Dynamic schema creation; US8103951; 2010-04-01. By Geoff Schuller and Yan Guo; application by Apple. Copying cells from a spreadsheet and pasting onto database table, expanding the database schema to fit the content if needed (adding columns or records).


345. Defining spreadsheet functions; US2010095195; 2010-04-15. By Michael Coblenz and others; application by Apple. The behavior associated with the arguments of a function is abstracted from the function definition. E.g. a function may only accept numerical values.


348. Logical spreadsheets; US7707486; 2010-04-27. By Michael Genesereth, Michael Kassoft and Nathaniel Love. A spreadsheet in which logical constraints on the values of cells can be specified, and the values of cells can be set in any order, possibly restricting or conflicting with values in other cells. Binary decision diagrams [1] would seem ideal for implementing this in the case of discrete cell values.


351. Minimap navigation for spreadsheet; US2010146434; 2010-06-10. By Tomi Blinnikka and others; application by Yahoo. Displaying a miniature map of the shown spreadsheet.

352. Systems and methods to create a multidimensional expression calculated member in a spreadsheet cell; US8386916; 2010-07-01. By Pierre Le Brazidec and others; application by SAP. Importing data from multidimensional database (e.g. OLAP) using built-in query-functions.

354. User programmable deductive spreadsheet apparatus which supports solutions to circular definitions; US7761782; 2010-07-20. By David Warren and others; application by XSB. Logic programming in spreadsheet.

355. Run-time optimizations of queries with SQL spreadsheet; US7761403; 2010-07-20. By Andrew Witkowski and others; application by Oracle. Efficient queries and recalculation in a spreadsheet drawing data from a relational data base; pruning; parallelization; use of a dependency graph. Closely related to patents 179 and 188. This looks like a rather substantial patent application.

356. System and method for transforming an XML file into an add-in function for implementation into a spreadsheet application; US7770110; 2010-08-03. By Howard Mansell and others; application by Credit Suisse Securities. Calling functions from COM add-in through spreadsheet functions.

357. System and computer program product for displaying and/or hiding a range of cells in an electronic spreadsheet; US8230321; 2010-08-05. By Jean-Jacques Aureglia and Frederic Bauchot; application by IBM. Hiding cells ranges based on their priority level.

358. Grid presentation in web-based spreadsheet services; US8689095; 2010-08-12. By Dan Parish and others; application by Microsoft. Synchronizing spreadsheet cells with web-client.


360. Facilitating spreadsheet and database views on common data store; US2010211862; 2010-08-19. By Dan Parish and others; application by Microsoft. Spreadsheet as database UI.

361. System and method for formula evaluation in spreadsheets on small devices; US8707156; 2010-10-07. By Wei Xue and others; application by Business Objects SA. Pasting cell range overlapping with non-empty cells pushes these non-empty cell ranges out of the way.


363. Method and apparatus for formula evaluation in spreadsheets on small devices; US7793210; 2010-09-07. By Paul Rank and John Pampuch. Describes the idea, but few technical details, of cross-compilation of spreadsheet formulas for space-conserving execution on a PDA. This involves, for instance, leaving out unused library functions.

364. System and method for performing over time statistics in an electronic spreadsheet environment; US7810032; 2010-10-05. By Frederic Bauchot and Gerard Marmigere; application by IBM. Computing statistics from a stream of values, appearing one value at a time in a particular cell.


366. Networked spreadsheet template designer; US8473837; 2010-11-18. By Laksmi Thanu and others; application by Microsoft. Closely related to
368. Multidimensional cube functions; US2010312748; 2010-12-09. By Howard Dickerman and others; application by Microsoft. Imports data from multidimensional database (e.g. OLAP) using built-in query-functions.


370. Filter and sort by format; US8745482; 2010-12-23. By Charles Ellis and others; application by Microsoft. Filtering and sorting cells by their visual formatting.


373. Metadata creation; US8335981; 2011-02-03. By Alexis Naibo and Philippe Meiniel; application by Business Objects Software. Extracting meta data from spreadsheets (e.g. finding tables, table orientation, table headers).


377. Determining a location for placing data in a spreadsheet based on a location of the data source; US7930626; 2011-04-19. By Bill Serra, Salil Pradhan and Antoni Drudis; application possibly by Hewlett-Packard. Handling streams of input values, as from multiple external sensors, in a continually updated spreadsheet. Mentions "dependency trees".

378. One click conditional formatting method and system for software programs; US7933862; 2011-04-26. By Benjamin Chamberlain and others; application by Microsoft. Using logical conditions to control formatting of spreadsheet cells, and using graphical components (such as histograms) in spreadsheet cells.

379. System and method for managing a spreadsheet; US8407579; 2011-05-05. By Ramkumar Raja and others; application by Balenz Software. Importing data from digital image into spreadsheet (e.g. scanned utility bill). Defines various UI components and functionality to accomplish this. Closely related to patent 201 and 234.

380. Method and system in an electronic spreadsheet for persistently filling by samples a range of cells; US8971134; 2011-06-28. By Frederic Bauchot; application by IBM. Fill a cell range by sampling and interpolating from existing values.


382. Method, system, and apparatus for exposing workbooks as data sources; US7991804; 2011-08-02. By Daniel Battagin and others; application by Microsoft. Appears related to patent 334.

CHAPTER 1. PATENTS AND APPLICATIONS


387. Multi-threaded sort of data items in spreadsheet tables; US2011264993; 2011-10-27. By Peter Leong Weng Keong and others; application by Microsoft. Divides rows into blocks which are sorted in parallel. Uses two threads to merge blocks. Closely related to patent 389.

388. Method and system for converting a schema-based hierarchical data structure into a flat data structure; US8051373; 2011-11-01. By Chad Rothschiller, Michael McCormack and Ramakrishnan Natarajan; application by Microsoft. Using schema-derived layout rules to allocate the elements of an XML document to cells in a spreadsheet.

389. Multi-threaded sort of data items in spreadsheet tables; US8527866; 2011-11-03. By Carl Sutter IV and others; application by Microsoft. Closely related to application 387.

390. Multi-threaded adjustment of column widths or row heights; US2011276868; 2011-11-10. By Thomas Hoke and others; application by Microsoft. Find cell requiring the most width in a column in parallel to decide column width.

391. Calculation of spreadsheet data; US2011276870; 2011-11-10. By Sanjay Kulkarni and others; application by Microsoft. Evaluate cells in parallel. Relates to formulas referencing constant/input cells (i.e. no dependencies between parallel tasks).

392. Creating text functions from a spreadsheet; US8499290; 2011-12-15. By John Messerly and others; application by Microsoft. Define and compile function based on existing cells. Select cells to substitute with function arguments.

393. Decompiling loops in a spreadsheet; US2011314365; 2011-12-22. By John Messerly and others; application by Microsoft. Detect loops by finding circular dependencies or repeating expressions in R1C1 notation.

394. Method and system for inferring a schema from a hierarchical data structure for use in a spreadsheet; US8086959; 2011-12-27. By Chad Rothschiller and others; application by Microsoft. Inferring a schema for XML data stored in a spreadsheet program.

395. URL-facilitated access to spreadsheet elements; US8825745; 2012-01-12. By Shahar Prish; application by Microsoft. Identify and access parts of spreadsheets through URL (e.g. a range of cells or a chart).

396. Methods, apparatus, systems and computer readable mediums for use in association with electronic spreadsheets; US9069747; 2012-03-01. By Thorsten Uberschaer and Gilbert Karbach. Multiple layers of cells in a spreadsheet. Layer priorities decide which cells are shown when cells overlap.

397. Systems and methods for fast remote data access from a spreadsheet; US8271519; 2012-05-03. By Brian Young. Import data to a spreadsheet using user-defined functions.

398. Spreadsheet model for distributed computations; US2012110428; 2012-05-03. By Heinrichus Meijer; application by Microsoft. Distributing spreadsheets and cells while promis-
ing eventual consistency of calculations.

   By Zachary Lloyd and others; application by Google. UI model anchoring content to a
   base layer. Viewport navigates and shows part of the base layer.

400. Computer-implemented method for displaying data values calculated by a spreadsheet-
   function; US9075787; 2012-05-31. By Arno Schoedl. Define a function by supplying the
   set of input cells, intermediate cells, and the output cell.

401. Automatic spreadsheet validation; US9298687; 2012-05-31. By Lukas Petrovicky and
   Jiri Pechanec; application by Red Hat. Automated spreadsheet unit testing.

402. Systems and methods to provide dynamic local members associated with an add-in for
   a spreadsheet application; US9098483; 2012-06-07. By Pierre Le Brazidec and Florent
   Migeon. Define a formula dependent on external data. Attach a formula relative to
   some anchor in the spreadsheet (e.g. next to column C).

403. Location aware spreadsheet actions; US9811516; 2012-06-14. By John Campbell and
   others; application by Microsoft. Location based (e.g. GPS) formulas, filtering, etc.

   Chan and others; application by Microsoft. A find-and-replace function that handles
   multiple sheets in a workbook; can find and change formatting attributes; and can be
   suspended for editing and later resumed. Closely related to application 587.

   Fisher and others; application by Microsoft. Customized data visualization using prim-
   itive shapes with data-dependent properties.

406. * Parser, code generator, and data calculation and transformation engine for spread-
   Describes compilation of spreadsheets to Java source code. There are other patents and
   applications with the same title and by the same authors: US7010779, US7836425 and
   US2014149962.

407. Web page application controls; US9003298; 2012-07-05. By Tom Hoke and others; ap-
   plication by Microsoft. Gesture and touch based controls for web-based spreadsheet
   application.

408. Structured domain specific language and grid valued machine for creating spread-
   sheets and numerical plans; US2012179956; 2012-07-12. By Daniel Winterstein. DSL
   and abstract machine for expressing spreadsheets.

409. Hybrid client/network service application integration; US2012192052; 2012-07-26. By
   Josh Caplan and Sergei Gundorov; application by Microsoft. Mixing local calculations
   for local data with non-local calculations for non-local data.

410. Processing a spreadsheet for storage in a database; US8856284; 2012-08-16. By Ri-
   cardo Olivieri and Mark Whelan; application by IBM. Process a spreadsheet to store
   its data in a database. This is done with a configuration file that identifies the data
   type of each record.

411. Private views of data and local calculations during real time collaboration; US9275032;
   2012-08-23. By Johnny Campbell and others; application by Microsoft. Closely related to
   patent 297.

412. Code generation based on spreadsheet data models; US8583530; 2012-09-20. By Peter
   Esbensen; application by Hartford Fire Insurance Co. Generation of code, C or C++,
   based on a spreadsheet. This allows for compilation and potential GPGPU execution.
413. Spreadsheet control program, spreadsheet control apparatus and spreadsheet control method; US8782511; 2012-10-11. By Ryo Shimizu; application by UEI. Lines drawn on a touch screen forming a grid is interpreted as a spreadsheet.

414. Methods and systems to facilitate providing spreadsheet and database data to users via a social network; US9330080; 2012-12-27. By Christian Muenkel; application by SAP. Users may subscribe to data in other users' spreadsheets ensuring that their data is up-to-date.

415. System and method for dynamic data access in a spreadsheet with external parameters; US2013013994; 2013-01-10. By Robert Handsaker. A workbook defines external values it depends on, several such parameterized workbooks can be created. When the parameters are known a concrete workbook can chosen upon some criteria. Closely related to patent 239.

416. Method, system, and apparatus for providing access to workbook models through remote function calls; US9317495; 2013-01-10. By Dan Khen and others; application by Microsoft. A workbook can be used to define a model with input and output cells. This model can be uploaded to a server and accessed through remote procedure calls. Closely related to patents 152 and 314.

417. Providing spreadsheet features; US2013055057; 2013-02-28. By Peter Berger and Yaniv Gur; Application by Hydradx. Spreadsheet features, e.g. a summary of a selection, are provided and potentially degraded based on a heuristic. Closely related to patent 340.


419. Multi-cell selection using touch input; US2013061122; 2013-03-07. By Manish Sethi and Rajat Bhargav; application by Microsoft.

420. Data from web documents in a spreadsheet; US2013061123; 2013-03-07. By Jonathan Rochelle and others; application by United Technologies. Facts from a fact repository may be inserted into a spreadsheet. The fact repository may be populated from web documents.

421. Network-based data consolidation, calculation and reporting engine; US8601360; 2013-03-21. By Milliken Fernandes and others; application by Morgan Stanley. The cells of a workbook may be tagged to allow multiple workbook analyses and report generation.

422. Data reporting; US2013073940; 2013-03-21. By Jeffrey Honsowetz. Data may be imported into a spreadsheet from external sources through an add-in function.

423. Spreadsheet based data store interface; US9092412; 2013-04-04. By David Salch and others; application by Cirro. Use spreadsheets as an interface for data store.

424. Automatic scoping of data entities; US9069748; 2013-04-04. By Allan Folting and others; application by Microsoft. Method for displaying data summary tables, such as a pivot table, with suggestions for columns in the table.

425. Spreadsheet program-based data classification for source target mapping; US2013110884; 2013-05-02. By Christopher Eakins; application by Microsoft. External data sets can be marked up to classify their attributes into standard information types, which allows a spreadsheet program to import or manipulate the data.

Structured modeling of data in a spreadsheet; US2013124957; 2013-05-16. By Diego Oppenheimer and others; application by Microsoft. Modeling the the structure of data in a spreadsheet, allowing for automatic updates of the model and for queries to be performed on the model.


Method and system for repurposing a spreadsheet to save paper and ink; US8799761; 2013-05-23. By Naveen Goel and others; application by Adobe. When printing a spreadsheet, identify print zones of logically related cells which may be transformed to save paper.

Quick analysis tool for spreadsheet application programs; US2013145244; 2013-06-06. By Chad Rothschiller and others; application by Microsoft. Upon data selection a quick analysis button is shown. The button opens a toolbar with data-analysis options.

Browser spreadsheet integration; US8640022; 2013-06-13. By Lawrence Waldman and others; application by Microsoft. A spreadsheet within a browser with the ability to reference objects outside of the sheet.

Input trail on data entry; US9043693; 2013-07-04. By Christian Baeck and others; application by SAP. When recalculations prompted by cell changes are lengthy, recalculations can be set to only happen upon user request. The spreadsheet keeps track of modified cells.

Custom browser-side spreadsheet functions; US9389891; 2013-07-11. By Daniel Batten and Shahar Prish; application by Microsoft. In a spreadsheet running on a client server architecture, UDFs may be allowed to be computed on the client as to not pose a security risk to the server.

Data cell cluster identification and table transformation; US9311371; 2013-09-12. By Mayur Mohan and others; application by Business Objects Software. Method for automatically identifying visual cell clusters/groupings for export or reports.

Computer-implemented methods and systems for associating files with cells of a collaborative spreadsheet; US2013254157; 2013-09-26. By Brian Havlin and others; application by Adobe. Include a file in the cell of a spreadsheet and store the file with the sheet in the cloud.

Tabular widget with mergable cells; US2013262974; 2013-10-03. By Michael Anstis and Mark Proctor; application by Red Hat. Handling manipulation of decision tables with a grid widget that handles (un)grouping, (un)merging and collapsing cells.

Collaborative online spreadsheet application; US9280533; 2013-10-03. By Jonathan Rochelle and others; application by Google. Synchronization and computation of a collaborative spreadsheet hosted on a server that may receive requests from several browsers. Portions of the spreadsheet calculations are done by the clients other portions by the server. Closely related to patent 226.

CHAPTER 1. PATENTS AND APPLICATIONS


445. Block properties and calculated columns in a spreadsheet application; US8621340; 2013-12-31. By Joseph Chirilov and others; application by Microsoft. How to prescribe properties, such as formatting, for blocks, where a block is a logical area of a spreadsheet that grows or shrinks as rows and columns are added to or removed from it. Closely related to application 448.

446. Spreadsheet schema extraction; US2014075278; 2014-03-13. By Mihaela Bornea and others; application by IBM. A schema with entry element information can be extracted from spreadsheet format.

447. Spreadtree hierarchy system for spreadsheets and related methods; US2014082470; 2014-03-20. By David Trebas and others; application by 4clicks Solutions. Solving the problem of spreadsheets referencing each other with a spreadtree that consists of several spreadsheets in a hierarchy.


451. Dashboard visualizations using web technologies; US2014149836; 2014-05-29. By Jason Bedard and Viren Kumar; application by Business Objects Software. Export spreadsheet to JSON format so it can be rendered as a web-based dashboard system.


455. System for the interaction among spreadsheets over networks; US2014157098; 2014-06-05. By Massimo Maresca; application by M3S SRL. System for handling synchronization and interaction between multiple users and spreadsheet over a network.

456. Systems and methods for managing spreadsheet models; US9575950; 2014-06-12. By David Matheson and Somik Raha; application by Smartorg. A model template can be created from a spreadsheet, which contains input/output information and deployment information. Several instances of a model template can be deployed.

457. Method and system for expanding and collapsing data cells in a spreadsheet application; US2014164896; 2014-06-12. By Thomas Schlereth; application by Can Do Gmbh. A cell/row may be expanded into a sub-row that contain more information about the parent cells.


460. Spreadsheet viewer facility; US2014189483; 2014-07-03. By Wasif Awan and Mushegh Hakhninian; application by Intralinks. System for securely sharing spreadsheets between different users and businesses.

461. Translating natural language descriptions to programs in a domain-specific language for spreadsheets; US9330090; 2014-07-31. By Sumit Gulwani and Mark Marron; application by Microsoft. Natural language commands can be used to perform spreadsheet operations. E.g. “Multiply item count and quantities”.

462. Methods, systems and computer program products for facilitating visualization of interrelationships in a spreadsheet; US2014223276; 2014-08-07. By Michael Chavoustie and others; application by IBM. Closely related to patent 458.


464. Ranking graphical visualizations of a data set according to data attributes; US8812947; 2014-08-19. By Hillel Maoz and others; application by Google. Visualization recommendations are made to the user by ranking visualizations according identified types/attributes.

465. For a given cell in a spreadsheet, evaluating an unlimited number of conditional formatting rules and applying multiple corresponding Formats to the cell; US2014237339; 2014-08-21. By Benjamin Chamberlain and others; application by Microsoft.


469. Telling interactive, self-directed stories with spreadsheets; US2014372850; 2014-12-18. By John Campbell and others; application by Microsoft. Spreadsheet presentation engine based on concept of storytelling.

470. Conversion of data ranges to table objects; US2014372851; 2014-12-18. By Allison Rutherford and others; application by Microsoft. Manual or automatic cell range to table conversion.

471. Showing presence of multiple authors in a spreadsheet; US2014372852; 2014-12-18. By Chad Rothschiller and others; application by Microsoft. Display who is editing what in a collaborative spreadsheet.


473. Seamless grid and canvas integration in a spreadsheet application; US2014372858; 2014-12-18. By John Campbell and C Radakovitz; application by Microsoft. Allow cells to move between being bound to the grid and being free-floating while maintaining references.

474. Filtering data with slicer-style filtering user interface; US2014372932; 2014-12-18. By Allison Rutherford and others; application by Microsoft. Closely related to application 546.

475. Automatically displaying suggestions for entry; US2014372933; 2014-12-18. By Prashant Shirolkar and others; application by Microsoft. Suggest cell contents while it is being edited.

476. Simplified data input in electronic documents; US2014372952; 2014-12-18. By Carlos Otero and others; application by Microsoft. Cell editing gestures for data completion, formula entry, etc.

477. Embedded experience through bidirectional integration of CRM applications and spreadsheet applications; US2014380139; 2014-12-25. By Ron Mondri and Madan Natu; application by Microsoft. Interfacing spreadsheet and CRM applications.


482. Analyzing files using big data tools; US2015032743; 2015-01-29. By Sanjay Agrawal; application by Cimcon Software. Converting spreadsheets to format compatible with big data tools.

483. System and method for rectangular region covering; US8983901; 2015-03-17. By Benjamin Simon; application by Google. Given a set of partially overlapping cell ranges, produce a minimal set of non-overlapping covering subranges.
484. Automatic column resizing; US9740676; 2015-03-26. By Shaun Logan and Edmund Davis; application by Oracle. When using spreadsheet as front end for an application, automatically resize columns based on application data.

485. Use of temporary optimized settings to reduce cycle time of automatically created spreadsheets; US9870354; 2015-03-26. By Scott Hicks and others; application by IBM. Improve efficiency of data conversion from native to spreadsheet format by optimizing the settings of the spreadsheet application. Closely related to patent 253.

486. Extracting relational data from semi-structured spreadsheets; US2015095312; 2015-04-02. By Sumit Gulwani and others; application by Microsoft. DSL for creating programs to extract relational data from spreadsheets.

487. Using spreadsheets as a basis for enhanced application development; US9298454; 2015-04-16. By Uzi Tuvian and others; application by Microsoft. Generating application components from spreadsheet.


489. Indexing spreadsheet structural attributes for searching; US2015120748; 2015-04-30. By Steven Kraynak and others; application by Microsoft. Searching for spreadsheets with certain attributes (e.g. amount of formulas, errors, etc.).

490. System and method for storing a series of calculations as a function for implementation in a spreadsheet application; US9037961; 2015-05-19. By Howard Mansell; application by Credit Suisse Securities. Given a range of input cells and an output cell, define a spreadsheet function based on the given and intermediate cells.

491. Methods, systems and computer program products for processing cells in a spreadsheet; US9047266; 2015-06-02. By Michael Chavoustie and others. Describes a kind inlining of expressions from referred-to cells.

492. Method for inserting or deleting cells, rows or columns in spreadsheet and a device therefor; US2015161095; 2015-06-11. By Hui Wang and others; application by Zhuhai Kingsoft Office Software. Inserting or deleting cells, rows or columns on a touch-enabled device.


494. Interaction with spreadsheet application function tokens; US2015169532; 2015-06-18. By Carlos Otero and others; application by Microsoft. Interacting with formula expression on token-level.

495. System and method for providing online data management services; US9201858; 2015-07-09. By Ronald Ho and Fuzzy Khosrowshahi; application by Google. Freezing rows or columns, splitting the spreadsheet UI into at most three parts in each direction, allowing only the middle part to be scrolled.

496. Web-based spreadsheet interaction with large data set; US9256589; 2015-07-09. By Varouj Chitilian and others; application by Google. Interacting with spreadsheet on remote server from web-client.

497. Automatic relationship detection for spreadsheet data items; US9852121; 2015-07-09. By Allan Folting and others; application by Microsoft. Managing relationships in spreadsheets for summaries (e.g. employee IDs).
CHAPTER 1. PATENTS AND APPLICATIONS

498. Resolving mutations in a partially-loaded spreadsheet model; US9311622; 2015-07-09. By Amod Karve and Niklaus Haldimann; application by Google. Online collaboration when spreadsheet is only partially loaded by collaborators.


504. Associating captured image data with a spreadsheet; US9697193; 2015-09-10. By Amy Lin and others; application by Microsoft. Importing structured data from image into spreadsheet.

505. Enhanced indicators for identifying affected data; US2015261736; 2015-09-17. By Allison Rutherford and others; application by Microsoft. Visualize affected cells before performing multi-cell operations (e.g. sorting or filtering).

506. Spreadsheet data transfer objects; US9552283; 2015-10-08. By John Michelsen; application by CA Technologies. Generate spreadsheet template representing a data transfer object to be used for software testing.


512. Interaction between web gadgets and spreadsheets; US9514116; 2015-12-03. By Lawrence Waldman and others; application by Microsoft. Binding a gadget (e.g. a chart) to a range of cells allowing it to update whenever these are modified.

513. Persistently self-replicating cells; US2015370775; 2015-12-24. By Frederic Bauchot; application by IBM. Define set of cell ranges with shared content. When a cell in
range is updated, the corresponding cells in the other ranges in the set are updated as well.

514. System and method for operating a computer application with spreadsheet functionality; US9552348; 2015-12-31. By Koustubh Moharir and others. A computation model allowing cell evaluation to create or delete cells. Uses iterative approach updating the dependency graph to account for cell creation and deletion. Orders evaluation so cell creations and deletions take priority.


516. Validation of formulas with external sources; US2016004684; 2016-01-07. By Gary Cudak and others; application by IBM. Match formula with database of known accurate formulas to validate it.


520. Automatically adjusting spreadsheet formulas and/or formatting; US9652446; 2016-02-25. By John Creason and others; application by Smartsheet. Mimic nearby row formatting and formulas when updating a row.

521. Peer to peer spreadsheet processing; US2016055140; 2016-02-25. By Stuart McKenzie and others; application by Purple Robot Software. Separating spreadsheet content between peers. (E.g. an expert peer with proprietary formulas and a client peer supplying inputs for these formulas.)

522. Managing objects in panorama display to navigate spreadsheet; US2016062585; 2016-03-03. By Amy Lin and others; application by Microsoft. Displaying spreadsheet on narrow screen pulling in controls from the left and right when needed.

523. Tracking changes in on-line spreadsheet; US9286342; 2016-03-15. By Varouj Chitilian and others; application by Google.


527. Visual aid to simplify achieving correct cell interrelations in spreadsheets; US6460059; 2002-10-01. By Robert Wianiewski. Describes a system for visualizing which cells a given cell depends on, and vice versa.

528. Data processing device and method; US2016124932; 2016-05-05. By Xiao Chen and others; application by IBM. When working with large external data sets, only part of
it is loaded into the spreadsheet while the rest is represented by a hyper-row. Cells in
the hyper-row can be used like regular cells in functions like SUM


530. System and method for accessing rich objects via spreadsheets; US9880993; 2016-05-26. By Derek Cicerone; application by Palantir Technologies. Objects in cells and member access using dot-notation (e.g. A1.close).


532. Efficient copy paste in a collaborative spreadsheet; US2016162461; 2016-06-09. By Benjamin Simon and others; application by Google. Asynchronous collaboration using central server to order messages and perform transformations to resolve conflicts. (E.g. concurrent cell change and row insert. If the row insert is ordered before cell change, row number of cell change message is incremented.)

533. Presentation of content from within spreadsheet application; US2016173541; 2016-06-16. By Amit Gusain; application by Microsoft. Creating a presentation from spreadsheet content and keeping it up-to-date with the spreadsheet.

534. Cell view mode for outsized cells; US2016188187; 2016-06-30. By Rajat Bhargav and others; application by Microsoft. Visual indication that cell content is hidden (e.g. due to overflow) and option to display all content in separate view.


536. Generating scenes and tours in a spreadsheet application; US2016196674; 2016-07-07. By Scott Ruble and others; application by Microsoft. A presentation format where a tour of a spreadsheet is given.


538. Automated data conversion and presentation utility; US2016224535; 2016-08-04. By Nitin Mathur and others; application by Bank Of America. Generating slide shows from spreadsheets.


540. Analysis with embedded electronic spreadsheets; US2016261577; 2016-09-08. By Jih-Shiang Chang and others; application by Microsoft. Interfacing with CRM applications.

541. Smart fill; US2016275066; 2016-09-22. By Carlos Otero and others; application by Microsoft. Closely related to application 591.


543. Computer implemented systems and methods for transforming data; US9727550; 2016-11-03. By Min He and others; application by SAP. Combining data sources for e.g.
analysis by generating data flow graph composed of operations like union, join, output, etc.

544. Computer implemented systems and methods for automatic generation of data transformations; US9824081; 2016-11-03. By Claudia Lehmann and others; application by SAP. Closely related to patent 543.

545. Computer implemented systems and methods for data usage monitoring; US2016321232; 2016-11-03. By Khuan Tan and others; application by SAP. Closely related to patent 543.

546. Slicer elements for filtering tabular data; US2016334955; 2016-11-17. By Johnny Campbell and others; application by Microsoft. GUI for filtering data by creating so called slicers: a GUI-element that shows each unique value of a column. The unique values in the slicer are used to filter data. Closely related to application 474.

547. Method and computing device for maintaining dependencies among reference elements; US2016342582; 2016-11-24. By Dustin Hiatt and others; application by Workiva. Method for keeping track of dependencies for recalculation. During recalculation cell formulas are divided into different groups where formulas of each group can be evaluated in parallel.

548. Methods and systems for dynamic graph generating; US2016350950; 2016-12-01. By Colin Ritchie and Cameron Ritchie. Dynamically creating figures suitable for the selected data in a third party program. Difficult to figure out how a figure types are chosen.

549. Apparatus, system and method of presenting views of a user's data using summary tables; US2016378811; 2016-12-29. By Anukul Kapoor and Edward Hogan; application by Apple. A way of showing summary of tabular data (not pivot table) on a small screen.

550. Enhanced mechanisms for managing multidimensional data; US9817876; 2016-12-29. By Pierre Demonsant and others; application by Planisware Sas. Import a spreadsheet and treat it as an OLAP cube.

551. Method for integrating software components into a spreadsheet application; US9582288; 2017-02-28. By James Stewart; application by Mathworks. Use programs as functions directly in a spreadsheet. This is done through GUI. Closely related to patent 321.

552. System and process for generating an internet application; US2017060830; 2017-03-02. By Kevin Liao and others; application by Ytmpl Consulting Pty. Convert spreadsheet to an XML-format suitable for viewing, possibly on a web-page.


554. Representing and manipulating hierarchical data; US2017091166; 2017-03-30. By David Greenwood; application by Power Modes Pty.

555. Stream-enabled spreadsheet as a circuit; US2017097925; 2017-04-06. By Martin Hirzel and others; application by IBM. Compile transformations defined in a spreadsheet to a program that can be used on a data stream. Similar to US2017228357 also by IBM.

556. Automated structured cloud datatester; US2017116171; 2017-04-27. By Jr Bruce Villard and Henry Will I; application by IBM. Spreadsheet validation analysing consecutive cells to flag e.g. irregular cell references, shifted cells, etc.

558. Suggesting a set of operations applicable to a selected range of data in a spreadsheet; US2017124058; 2017-05-04. By Carlos Otero and others; application by Microsoft.

559. Modern spreadsheet arrays; US2017124142; 2017-05-04. By Andrew Becker and others; application by Microsoft. An array in a cell unfolds its value over neighboring cells (e.g. B1: = (A1:A2). The value of B2 is A1). In addition array functions such as SORT and UNIQUE are included.

560. Decks, cards, and mobile UI; US2017124055; 2017-05-04. By Samuel Radakovitz and others; application by Microsoft. Create views, e.g. each row is formatted as a box, of spreadsheet data to make it more readable on mobile devices. A bit reminiscent of XSLT for XML -> HTML.

561. Operations on dynamic data associated with cells in spreadsheets; US2017124047; 2017-05-04. By John Campbell and others; application by Microsoft. Including dynamic data, e.g. video/audio, in cells and functionality to process this data.


564. Method and apparatus providing contextual suggestion in planning spreadsheet; US2017132195; 2017-05-11. By Shaileshbhai Gothi and others; application by SAP. Cell content suggestion based on cell context. E.g. if the cell is in a row with countries, other countries are suggested.


566. Spreadsheet with unit based math; US2017161251; 2017-06-08. By Terry Olkin and Brian Morris; application by Workday. Enables unit math such as $2\text{m} \times 3\text{m} = 6\text{m}^2$. Does not support user defined units.

567. Spreadsheet with unit based conversions; US2017161250; 2017-06-08. By Terry Olkin and Brian Morris; application by Workday. Closely related to application 566.

568. Spreadsheet with unit parsing; US2017161249; 2017-06-08. By Terry Olkin and Brian Morris; application by Workday. Closely related to application 566.


572. Parameterizing and working with math equations in a spreadsheet application; US2017220543; 2017-08-03. By Christian Canton and others; application by Microsoft. Extending spreadsheets with equations and equation related functionality such as solving an equation.
573. Encoding a spreadsheet program for stream processing; US2017228358; 2017-08-10. By Martin Hirzel and others; application by IBM. Related to application 574.

574. Spreadsheet compiler for stream processing; US2017228357; 2017-08-10. By Martin Hirzel and others; application by IBM. A spreadsheet is compiled to C++ so it can be used to process data streams. See also US2017228358.

575. Facilitating interaction with a spreadsheet; US2017242837; 2017-08-24. By Frederic Bauchot and Georges-Henri Moll; application by IBM. Detect and let the user mark input cells of a spreadsheet, so these can be visualized across sheets and easily be changed for experiments.

576. Spreadsheet with dynamic cell dimensions generated by a spreadsheet template based on remote application values; US2017242838; 2017-08-24. By Kirk Krappe; application by Aptttx. Limiting user’s access rights to set of columns/rows in a shared spreadsheet.

577. Techniques to present a dynamic formula bar in a spreadsheet; US2017249295; 2017-08-31. By Carlos Otero and others; application by Microsoft.

578. Dynamic disaggregation and aggregation of spreadsheet data; US2017255608; 2017-09-07. By Florent Migeon and Sebastien Lavoignat; application by Business Objects Software. Sub-rows may specify the disaggregation of a parent row.


582. Representation of people in a spreadsheet; US2017300466; 2017-10-19. By John Campbell and others; application by Microsoft. A person object to represent a person along with functions to e.g. send messages.


584. Codeless sharing of spreadsheet objects; US2017308617; 2017-10-26. By Daniel Parish and Daniel Battagin; application by Microsoft. Sharing spreadsheet objects or portions of a spreadsheet on e.g. social media through GUI.

585. Facilitating offline or other contemporaneous editing of tabular data; US2017329984; 2017-11-16. By Gary Clough and others; application by Winshuttle. Handling user rights in a shared spreadsheet.

586. Detecting errors in spreadsheets; US2017337238; 2017-11-23. By Benjamin Zorn and Emery Berger; application by Microsoft. Errors detected by comparing properties (e.g. values has $ as unit) of similar (e.g. cells of the same row) cells.


CHAPTER 1. PATENTS AND APPLICATIONS


590. Generation of classification data used for classifying documents; US2017351688; 2017-12-07. By Toshiaki Yasue; application by IBM. Classifying spreadsheet by counting number of cells that contain a common value.

591. Automatic semantic data enrichment in a spreadsheet; US2018004722; 2018-01-04. By Yaniv Naor; application by Microsoft. User may request for automatic filling of data in a spreadsheet. E.g. if column A contains countries and column B contains a single cell with the corresponding capital, then a capital relation may be determined and the rest of the cells of column B filled. Closely related to application 541.

592. Constructing new formulas through auto replacing functions; US2018005122; 2018-01-04. By Joseph McDaid and others; application by Microsoft. Rewriting formulas to equivalent and easily readable ones.

593. Performing server-side and client-side operations on spreadsheets; US9875226; 2018-01-23. By Daniel Gundrum and others; application by Google. Calculation can be balanced between client and server in a client-server spreadsheet. E.g. it may be preferable to do expensive computations server side.

594. Topological data analysis utilizing spreadsheets; US2018024981; 2018-01-25. By Huang Xia and Sanket Patel; application by Ayasdi. Analysis of topological data defined in a spreadsheet.

595. Data analysis expressions; US2018032498; 2018-02-01. By Howard Dickerman and others; application by Microsoft. Data analysis expressions (DAX) for multi-dimensional data analysis.

596. Inserting new elements in a tabular data structure; US2018039613; 2018-02-08. By Xiao Chen and others; application by IBM. Rows or columns can be added by enlarging a row/column. The expanded area is divided into new rows/cols.

597. Method, apparatus, and computer program product for solving equation system models using spreadsheet software; US9892108; 2018-02-13. By Chahid Ghaddar. Numerical optimization of a function defined by a cell. All cell references are seen as function variables. In this patent the optimization is done by an external program.

598. Collaborative spreadsheet data validation and integration; US2018046608; 2018-02-15. By Timothy Yousaf and others; application by Palantir Technologies. Collaborative spreadsheet that allows users to specify restrictions (e.g. only dates) on cells to ensure consistent data in the spreadsheet.
Bibliography


Index

Abastillas, Tisha, 21
Abell, Lynn, 33
Abramson, David, 15
Adler, Dan, 8, 11
Aebig, Russell, 32
Agassi, Sanjay, 41
Ahlers, Timothy, 12
Alden, Jeffrey, 13
Alexander, Rhonda, 6
Allen, Jason, 13, 19
Allison, Jane, 40
Ammirato, Joseph, 6, 7, 9
Anderson, Charles, 8, 9, 11
Anderson, Donna, 30
Androski, Matthew, 16
Angold, William, 15
Anstis, Michael, 38
Antony, Azio, 34
Arnott, Kevyn, 46
Aronson, David, 28
Auregla, Jean-Jacques, 16, 18, 29, 30, 34
Awan, Wasif, 39

Babanov, Alexander, 24
Babb, Edward, 7
Baeck, Christian, 38
Bagheri, Ramin, 24
Balaban, Robert, 6
Balducci, Corrado, 18
Baliga, Vijay, 22
Bar-On, Omer, 40
Bargh, Christopher, 22
Barinaga, Juan, 30
Barnett, Joseph, 10
Barrett, Robert, 24
Barton, Kristopher, 21
Bastian, Lewis, 6
Bates, Cary, 7

Battagin, Chapman, 39
Battagin, Daniel, 21, 38, 47
Bauchot, Frederic, 12–16, 18, 23, 25, 30, 34, 43, 47
Becerra, Santiago, 16
Becker, Andrew, 12, 22, 23, 46
Bedard, Jason, 39
Bedford, Jesse, 13, 20
Ben-Hur, Devin, 6
Ben-Tovim, Yariv, 21
Bennett, Paul, 14
Berger, Emery, 47
Berger, Peter, 33, 37
Bergman, Eric, 15
Beyda, William, 10
Bhansali, Anil, 9
Bhargav, Rajat, 37, 44
Blackwell, Alan, 16, 49
Blattner, Donald, 25
Blinnikka, Tomi, 33
Boon, Sean, 23
Bornea, Mihaela, 38
Boutin, Samuel, 37
Breuer, Matthias, 15
Briclkin, Dan, 7, 8
Brimm, John, 6
Bristow, Geoffrey, 22
Brittan, Philip, 11
Brown, Timothy, 7
Browne, Kevin, 24
Bryant, Randal E., 49
Burnett, Margaret, 12, 16, 49

Cahill, Jason, 13, 19
Calc, See OpenOffice Calc
Campbell, John, 30, 36, 40, 41, 44–47
Campbell, Johnny, 30, 36, 45
Canton, Christian, 46
Caplan, Josh, 36
Capson, Brian, 8
Card, Stuart, 10
Chamberlain, Benjamin, 22, 33, 40
Chan, Marise, 13, 20, 47
Chandrasekaran, Prasath, 42
Chang, Jih-Shiang, 44
Chang, Ming-Hsiung, 38
Chatenay Alain, 13
Chavoustie, Michael, 22, 39
Chen, Bo, 25
Chen, Michael, 38
Chen, Shing-Ming, 14
Chen, Xiao, 44, 48
Chen, Yen-Fu, 24
Cheng, Morgan, 27
Chi, Ed, 11
Chirilov, Joseph, 23, 31, 39
Chitilian, Varouj, 42, 43
Chivukula, Balakrishna, 27
Chopin, Stefan, 25, 27, 35
Chovin, Andre, 13
Cicerone, Derek, 44
Clay, Daniel, 21
Clough, Gary, 47
Coblentz, Michael, 33
Coffen, Wayne, 11, 18
Cohen, Ronen, 26
Collet, Jean-Luc, 17
Collie, Robert, 23, 24, 32
Comer, Ross, 9–12
Conlon, Thomas, 12
Cox, Alan, 17
Creason, John, 43
Crowe, Trevor, 18
Cseri, Istvan, 7, 10
Cudak, Gary, 43
Cuomo, Gennaro, 43
Damery, Eric, 27
Damm, John, 18
Danziger, Joshua, 42
Davis, Edmund, 41
Davis, Russell, 32
Demoncante, Pierre, 45
Despain, Stuart, 24, 30
Dickerman, Howard, 26, 27, 48
Dickerman, Laksmi, 34
Dillon, Patrick, 20
Dorman, Gregory, 34, 40
Dorwart, Richard, 16
Drudis, Antoni, 18, 22
Dubnoff, Steven, 5
Duzak, Jeffrey, 28
Eakins, Christopher, 37
Eberhardt, Peter, 22
Egilsson, ÁAgAÝst, 10, 13, 19
Ellis, Charles, 23, 24, 26, 30, 34
Erwig, Martin, 18, 29, 49
Esbensen, Peter, 36
Espinosa-Montalvo, Carlos, 31
Excel, See Microsoft Excel
Farahbod, Farzad, 12
Farr, George, 19
Fawcett, Andrew, 47
Fengli, Wang, 25
Fernandes, Milliken, 37
Fisher, Danyel, 36
Fitzpatrick, Alexander, 15
Folting, Allan, 25, 31, 37, 42, 45
Friend, John, 8
Frost, Brandon, 28
Fu, Chang-Wen, 26
Fu, Tsui-Ying, 32, 41
Gaffga, Joachim, 21
Gainer, David, 25, 26
García, Peralta, 47
García-Molina, Hector, 32
Garman, Mark, 10
Garrett, Andrew, 28, 29
Genesereth, Michael, 21
Geuss, Jo-Ann, 21
Geymond, Jean Paul, 8
Ghaddar, Chahid, 48
Gibb, Gary, 11
Gitlin, David, 31
Glass, Jonathan, 42
Glassey, Colin, 9
Gloski, David, 42
Glover, Timothy, 34
Goel, Naveen, 37
Gothi, Shaileshbhai, 46
Graham, Christopher, 7, 10, 17
Greenwood, David, 45
Greif, Irene, 6
Grose, Zoltan, 20
Gulwani, Sumit, 39, 41
Gundorov, Sergei, 36
Gundrum, Daniel, 48
Guo, Yan, 33
Gur, Yaniv, 33, 37
Gusain, Amit, 44
Guttmann, Steve, 28
Guttmann, Steven, 21

Hagger, Paul, 12
Hakhinian, Mushegh, 39
Haldimann, Niklaus, 42
Handsaker, Robert, 16, 28, 36
Handy-Bosma, John, 24
Harari, Albert, 12–14
Hariharan, Sreeram, 43
Harold, Lee, 20
Harris, Bret, 6
Harris, Darren, 42
Hatakeyda, Darrin, 10
Hatan, Yasuo, 29
Havlin, Brian, 38
He, Min, 45
Hernandez, Irene, 6
Hiatt, Dustin, 45
Hicks, D, 41
Hicks, Scott, 29
 Hirayama, Yuki, 8
Hiroshige, Yuko, 13
Hirzel, Martin, 45, 47
Ho, Ronald, 42
Hobbs, Craig, 16, 21, 28, 29
Hogan, Edward, 45
Hoke, Thomas, 35
Hoke, Tom, 36
Hollcraft, James, 17
Honsovetz, Jeffrey, 37
Hosea, Michael, 16
Hu, Kaicheng, 27
Hunter, Ross, 7, 10, 17
Hwong, Yao, 6

Igra, Mark, 12
Irrgang, Michael, 6

Jager, Bruno, 20
Jakobson, Gabriel, 27
James, Lisa, 7, 10, 17
Jamshidi, Ardeshir, 12, 17

Jania, Frank, 28
Jauffret, Jean-Philippe, 19
Jiang, Xin, 27
Johnson, Jeffrey, 10
Johnston, Gregory, 22
Jones, Bruce, 22
Jones, Russell, 22
Jonsson, Gunnlaugur, 18

Kaethler, Richard, 7, 9
Kahin, Brian, 49
Kahn, Philippe, 8
Kanai, Naoki, 6
Kanavy, Walter, 7
Kaneko, Mitsuro, 6
Kapoor, Anukul, 45
Kaptur, Joseph, 44
Karbach, Gilbert, 35
Karpe, Leonard, 47
Karve, Amod, 42
Kassoff, Michael, 21
Keeney, David, 13
Kelsey, Todd, 12
Khanna, Karan, 8, 9
Khen, Dan, 26, 31, 36
Khosrowsabhi, Farzad, 12
Khosrowsabhi, Fuzzy, 42
Kichenbrand, Nicolaas, 15
Killed, Brian, 17
Kirchner, John, 6
Kiyano, Hiko, 10
Kjaer, Henrik, 11
Knourenko Andrey, 16
Koorosh, Nouri, 11
Korzenko, Richard, 27
Kosana, Chakra, 40
Koss, Michael, 6
Kotler, MATTHEW, 24
Kotler, Matthew, 19, 20, 30
Koukerdjia, Francois, 19
Krappe, Kirk, 47
Krauthauf Gerhild, 23
Kraynak, Steven, 41
Krueger, Kevin, 30
Krueger, Robert, 25
Kugimiya, Shuzo, 11
Kulkarni, Sanjay, 31, 35
Kumar, Viren, 39
Kwatinetz, Andrew, 7
Index

Lai, Brandon, 46
Laikin, Edward, 35
Lakshmi, Thanu, 38
Landau, Remy, 5
Landsman, Richard, 6
Lange, Jonathan, 10
Lautt, Robert, 20
Lavoignat, Sebastien, 47
Le Brazidec, Pierre, 32, 33, 36
Lection, B, 31
Lection, David, 29, 31
Lehane, Michael, 42
Lehmann, Claudia, 45
Lehrian, Matthew, 33, 44
Leong Weng Keong, Peter, 35
Leong, Josh, 37
Lepanto, Robert, 40
Leung, Yi-Ming, 19, 26, 29
Lewis-Bowen, Alister, 25
Li, Baomin, 31
Li, Lixin, 12
Liao, Kevin, 45
Liebl, Herbert, 20
Lin, Amy, 42, 43
Lindhorst, Gregory, 31
Link, Troy, 10, 11
Lischner, Ray, 5
Litt, Steve, 46
Lloyd, Zachary, 35
Logan, Shaun, 41
Love, Nathaniel, 21
Lowry, Kent, 11, 18
Ludwig, Lester, 47
Lynch, William, 8

Macgregor, Kathryn, 7
Machart, Beverly, 6
Mackinlay, Jock, 11
Madsen, Robert, 11
Maguire, Justin, 13
Maliska, Jr Thomas, 46
Mandelbaum, Aaron, 21
Mansell, Howard, 34, 41
Mantuano, Brian, 29
Maoz, Hillel, 40
Marathe, Sharad, 16
Maresca, Massimo, 39
Marmigere, Gerard, 23
Marron, Mark, 39

Martin, Paul, 15
Martinez, Edward, 8, 9
Martynov, Alexander, 25
Marueli, Amichai, 28
Matsa, Moshe, 28
Matteson, Eric, 12
Mauduit, Daniel, 14
Mayo, Scott, 5
McCaskill, Rex, 6
McColl, William, 34
McCormack, Michael, 23, 26
McDaid, Joseph, 48
McGarrity, John, 34
McCabe, James, 18
McKnight, David, 19
McMullin, Angelina, 27
Medicke, John, 17
Megiddo, Eran, 25
Meijer, Heinricus, 35
Meiniel, Philippe, 34
Messerly, John, 35
Mestres, Jean-Christophe, 17
Michelsen, John, 42
Migeon, Florent, 32, 36, 47
Miller, Darren, 34
Miller, Gary, 34
Miller, Michelle, 15
Mills, Scott, 17
Milton, Andrew, 12
Milton, Michael, 27
Mingot, Frederic, 39
Misko, John, 10, 11
Mitsui, Kinichi, 27
Miyahara, Kouji, 37
Miyazaki, Kunihiko, 29
Mohan, Mayur, 38
Mohanir, Koustubh, 43
Moise, Wesner, 12
Molander, Mark, 28
Moll, Georges-Henri, 47
Mondri, Ron, 40, 41
Montigel, Markus, 14, 49
Moore, Victor, 43
<table>
<thead>
<tr>
<th>Name</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morash, Elisabeth</td>
<td>44</td>
</tr>
<tr>
<td>Morris, Brian</td>
<td>46</td>
</tr>
<tr>
<td>Morris, Richard</td>
<td>18</td>
</tr>
<tr>
<td>Morris, Robert</td>
<td>31</td>
</tr>
<tr>
<td>Moss, Ken</td>
<td>7</td>
</tr>
<tr>
<td>Muenkel, Christian</td>
<td>36</td>
</tr>
<tr>
<td>Mujica, Gayle</td>
<td>15</td>
</tr>
<tr>
<td>Muzumdar, Pavan</td>
<td>26</td>
</tr>
<tr>
<td>Nagai, Yasuo</td>
<td>10</td>
</tr>
<tr>
<td>Naibo, Alexis</td>
<td>34</td>
</tr>
<tr>
<td>Naimat, Aman</td>
<td>19</td>
</tr>
<tr>
<td>Nakano, Kimiyasu</td>
<td>28, 31</td>
</tr>
<tr>
<td>Naor, Yaniv</td>
<td>48</td>
</tr>
<tr>
<td>Narayanan, Raman</td>
<td>7</td>
</tr>
<tr>
<td>Natarajan, Ramakrishnan</td>
<td>23</td>
</tr>
<tr>
<td>Natu, Madan</td>
<td>40</td>
</tr>
<tr>
<td>Nault, Jacques</td>
<td>48</td>
</tr>
<tr>
<td>Netz, Amir</td>
<td>21</td>
</tr>
<tr>
<td>Nguyen, Huy</td>
<td>29</td>
</tr>
<tr>
<td>Noel, Gregory</td>
<td>10</td>
</tr>
<tr>
<td>Norden-Paul, Ronald</td>
<td>6</td>
</tr>
<tr>
<td>Nuñez, Fabian</td>
<td>49</td>
</tr>
<tr>
<td>Ogawa, Atsuro</td>
<td>15</td>
</tr>
<tr>
<td>Ohata, Michael</td>
<td>29</td>
</tr>
<tr>
<td>Okushiro, Hirotoshi</td>
<td>33</td>
</tr>
<tr>
<td>Oldershaw, Jolyan</td>
<td>32</td>
</tr>
<tr>
<td>Olivieri, Ricardo</td>
<td>27, 36</td>
</tr>
<tr>
<td>Olkin, Terry</td>
<td>46</td>
</tr>
<tr>
<td>Oppenheimer, Diego</td>
<td>37</td>
</tr>
<tr>
<td>Orchard, Andrew</td>
<td>22</td>
</tr>
<tr>
<td>Otero, Carlos</td>
<td>40, 41, 44, 46, 47</td>
</tr>
<tr>
<td>Paltrinieri, Massimo</td>
<td>8</td>
</tr>
<tr>
<td>Pampuch, John</td>
<td>13</td>
</tr>
<tr>
<td>Pardo, Rene K.</td>
<td>5</td>
</tr>
<tr>
<td>Parish, Dan</td>
<td>34</td>
</tr>
<tr>
<td>Parish, Daniel</td>
<td>47</td>
</tr>
<tr>
<td>Parlanti, Carlo</td>
<td>15</td>
</tr>
<tr>
<td>Patel, Dilip</td>
<td>31</td>
</tr>
<tr>
<td>Patel, Keyur</td>
<td>39</td>
</tr>
<tr>
<td>Patel, Sanket</td>
<td>48</td>
</tr>
<tr>
<td>patent, 5</td>
<td></td>
</tr>
<tr>
<td>Patterson, Eric</td>
<td>24</td>
</tr>
<tr>
<td>Payette, Raymond</td>
<td>27, 28</td>
</tr>
<tr>
<td>Peacock, Gavin</td>
<td>6, 7, 9</td>
</tr>
<tr>
<td>Pechanec, Jiri</td>
<td>36</td>
</tr>
<tr>
<td>Pedersen, Dan</td>
<td>11</td>
</tr>
<tr>
<td>Perez, Manuel</td>
<td>6</td>
</tr>
<tr>
<td>Perkins, Eric</td>
<td>28</td>
</tr>
<tr>
<td>Peter, Glen</td>
<td>33</td>
</tr>
<tr>
<td>Petrovicky, Lukas</td>
<td>36</td>
</tr>
<tr>
<td>Peyton Jones, Simon</td>
<td>16, 49</td>
</tr>
<tr>
<td>Piersol, Kirt W.</td>
<td>9, 16, 18, 49</td>
</tr>
<tr>
<td>Pradhan, Salil</td>
<td>18, 22</td>
</tr>
<tr>
<td>Presler-Marshall, Martin</td>
<td>42</td>
</tr>
<tr>
<td>Pressnall, Hunter</td>
<td>42</td>
</tr>
<tr>
<td>Press, Robert</td>
<td>14</td>
</tr>
<tr>
<td>Prish, Shahar</td>
<td>35, 38</td>
</tr>
<tr>
<td>Proctor, Mark</td>
<td>38</td>
</tr>
<tr>
<td>Radakovitz, C</td>
<td>40</td>
</tr>
<tr>
<td>Radakovitz, Sam</td>
<td>40</td>
</tr>
<tr>
<td>Radakovitz, Samuel</td>
<td>46</td>
</tr>
<tr>
<td>Rae, Chris</td>
<td>31</td>
</tr>
<tr>
<td>Raha, Somik</td>
<td>39</td>
</tr>
<tr>
<td>Raja, Ramkumar</td>
<td>26, 28, 34</td>
</tr>
<tr>
<td>Rajendran, Kuppayi</td>
<td>27</td>
</tr>
<tr>
<td>Rank, Paul</td>
<td>13, 15</td>
</tr>
<tr>
<td>Rao, Ramana</td>
<td>10</td>
</tr>
<tr>
<td>Rapp, Peter</td>
<td>30, 32</td>
</tr>
<tr>
<td>Rasin, Gregory</td>
<td>16</td>
</tr>
<tr>
<td>Raue, Kristian</td>
<td>17</td>
</tr>
<tr>
<td>Reaume, Daniel</td>
<td>13</td>
</tr>
<tr>
<td>Reeves, Andrew</td>
<td>24</td>
</tr>
<tr>
<td>Renshaw, Anthony</td>
<td>42</td>
</tr>
<tr>
<td>Renshaw, Carl</td>
<td>42</td>
</tr>
<tr>
<td>Reynolds, Taryn</td>
<td>44</td>
</tr>
<tr>
<td>Richter, John</td>
<td>16</td>
</tr>
<tr>
<td>Ritchie, Cameron</td>
<td>45</td>
</tr>
<tr>
<td>Ritchie, Colin</td>
<td>45</td>
</tr>
<tr>
<td>Robert, Wallace</td>
<td>21</td>
</tr>
<tr>
<td>Rochelle, Jonathan</td>
<td>27, 37, 38, 42</td>
</tr>
<tr>
<td>Rochelle, P</td>
<td>26</td>
</tr>
<tr>
<td>Roe, Paul</td>
<td>15</td>
</tr>
<tr>
<td>Rosenau, Matthias</td>
<td>20</td>
</tr>
<tr>
<td>Rothermel, Gregg</td>
<td>12</td>
</tr>
<tr>
<td>Rothschilder, Chad</td>
<td>22, 23, 25, 37, 40</td>
</tr>
<tr>
<td>RTCG, See runtime code generation</td>
<td></td>
</tr>
<tr>
<td>Rubin, Michael</td>
<td>16, 24, 39</td>
</tr>
<tr>
<td>Ruble, Scott</td>
<td>44</td>
</tr>
<tr>
<td>Rucker, Erik</td>
<td>46</td>
</tr>
<tr>
<td>Rui, Suying</td>
<td>28</td>
</tr>
<tr>
<td>Russell, Feng-Wei Chen</td>
<td>17</td>
</tr>
<tr>
<td>Rutherford, Allison</td>
<td>40, 42</td>
</tr>
<tr>
<td>Rutledge, Stephen</td>
<td>17</td>
</tr>
<tr>
<td>Ryan, Mark</td>
<td>13</td>
</tr>
<tr>
<td>Name</td>
<td>Indexes</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Salama, Roberto</td>
<td>8, 11</td>
</tr>
<tr>
<td>Salas, R. Pito</td>
<td>6</td>
</tr>
<tr>
<td>Salch, David</td>
<td>37</td>
</tr>
<tr>
<td>Sankaran, Mohan</td>
<td>43</td>
</tr>
<tr>
<td>Sasaki, Hirobumi</td>
<td>27</td>
</tr>
<tr>
<td>Sattler, Juergen</td>
<td>21</td>
</tr>
<tr>
<td>Savasta, Neil</td>
<td>33</td>
</tr>
<tr>
<td>Schlaflly, Roger</td>
<td>7, 8</td>
</tr>
<tr>
<td>Schlereth, Thomas</td>
<td>39</td>
</tr>
<tr>
<td>Schnurr, Jeffrey</td>
<td>20</td>
</tr>
<tr>
<td>Schoedl, Arno</td>
<td>35</td>
</tr>
<tr>
<td>Schuller, Geoff</td>
<td>33</td>
</tr>
<tr>
<td>Scott, Hills</td>
<td>32</td>
</tr>
<tr>
<td>Selvarajan, Inbarajan</td>
<td>20</td>
</tr>
<tr>
<td>Serra, Bill</td>
<td>18, 22</td>
</tr>
<tr>
<td>Serraf, Jacob</td>
<td>17</td>
</tr>
<tr>
<td>Sethi, Maniah</td>
<td>37</td>
</tr>
<tr>
<td>Seydnejad, Sasan</td>
<td>15</td>
</tr>
<tr>
<td>Seyler, Mark</td>
<td>6</td>
</tr>
<tr>
<td>Shah, Arpan</td>
<td>41</td>
</tr>
<tr>
<td>Sheretov, Andrei</td>
<td>12</td>
</tr>
<tr>
<td>Shimizu, Ryo</td>
<td>36</td>
</tr>
<tr>
<td>Shirolkar, Prashant</td>
<td>40</td>
</tr>
<tr>
<td>Siersted, Morten</td>
<td>16</td>
</tr>
<tr>
<td>Sigler, Jonathan</td>
<td>26</td>
</tr>
<tr>
<td>Sikka, Vishal</td>
<td>31</td>
</tr>
<tr>
<td>Sinikh, Roy</td>
<td>24, 25, 38, 39</td>
</tr>
<tr>
<td>Simon, Benjamin</td>
<td>41, 43, 44</td>
</tr>
<tr>
<td>Singh, Hardeep</td>
<td>12, 17</td>
</tr>
<tr>
<td>Slavens, James</td>
<td>29</td>
</tr>
<tr>
<td>Smialek, Michael</td>
<td>16, 24, 39</td>
</tr>
<tr>
<td>Softky, William</td>
<td>26</td>
</tr>
<tr>
<td>Soler, Catherine</td>
<td>18</td>
</tr>
<tr>
<td>Sorge, Terri</td>
<td>21</td>
</tr>
<tr>
<td>Spencer, Percy</td>
<td>7</td>
</tr>
<tr>
<td>Spitz, Gerhard</td>
<td>17</td>
</tr>
<tr>
<td>SpreadsheetConverter</td>
<td>17</td>
</tr>
<tr>
<td>Stanton, Scott</td>
<td>28</td>
</tr>
<tr>
<td>Stein, Adam</td>
<td>10</td>
</tr>
<tr>
<td>Stewart, James</td>
<td>31, 45</td>
</tr>
<tr>
<td>Sugimura, Kazumi</td>
<td>11</td>
</tr>
<tr>
<td>Sutter IV, Carl</td>
<td>35</td>
</tr>
<tr>
<td>Sylthe, Olav</td>
<td>34</td>
</tr>
<tr>
<td>Tafoya, John</td>
<td>20, 21</td>
</tr>
<tr>
<td>Takahara, Takashi</td>
<td>33</td>
</tr>
<tr>
<td>Takahashi, Tomonari</td>
<td>43</td>
</tr>
<tr>
<td>Takata, Hideo</td>
<td>15</td>
</tr>
<tr>
<td>Tamura, Motohide</td>
<td>10</td>
</tr>
<tr>
<td>Tan, Khuan</td>
<td></td>
</tr>
<tr>
<td>Tanenbaum, Richard</td>
<td>20, 22</td>
</tr>
<tr>
<td>Tanner, Ronald</td>
<td>13</td>
</tr>
<tr>
<td>Ternasky, Joseph</td>
<td>21, 28</td>
</tr>
<tr>
<td>Tesch, Falko</td>
<td>15</td>
</tr>
<tr>
<td>Thanu, Lakshmi</td>
<td>22, 23</td>
</tr>
<tr>
<td>Thanu, Laksmi</td>
<td>34</td>
</tr>
<tr>
<td>Thayne, Daren</td>
<td>11</td>
</tr>
<tr>
<td>Thomas, Peter</td>
<td>44</td>
</tr>
<tr>
<td>Thompson, Michelle</td>
<td>12</td>
</tr>
<tr>
<td>Thomsen, Erik</td>
<td>8</td>
</tr>
<tr>
<td>Thorndike, Karl</td>
<td>7</td>
</tr>
<tr>
<td>Todd, Stephen</td>
<td>23</td>
</tr>
<tr>
<td>Tokuyama, Takaki</td>
<td>10</td>
</tr>
<tr>
<td>Tortolani, Thomas</td>
<td>11</td>
</tr>
<tr>
<td>Tow, Bruce</td>
<td>33</td>
</tr>
<tr>
<td>Trebas, David</td>
<td>38</td>
</tr>
<tr>
<td>Tregenza, Christopher</td>
<td>16</td>
</tr>
<tr>
<td>Truntschka, Carole</td>
<td>17</td>
</tr>
<tr>
<td>Tuinenga, Paul</td>
<td>8</td>
</tr>
<tr>
<td>Turski, Andrzej</td>
<td>7</td>
</tr>
<tr>
<td>Tuvian, Uzi</td>
<td>41</td>
</tr>
<tr>
<td>Ueberschaer, Thorsten</td>
<td>35</td>
</tr>
<tr>
<td>Ulke, Markus</td>
<td>23</td>
</tr>
<tr>
<td>US12843745 (patent 225)</td>
<td>23, 34</td>
</tr>
<tr>
<td>US2001016855 (patent 106)</td>
<td>13</td>
</tr>
<tr>
<td>US2001056440 (patent 121)</td>
<td>15</td>
</tr>
<tr>
<td>US2002010743 (patent 104)</td>
<td>13</td>
</tr>
<tr>
<td>US2002055953 (patent 124)</td>
<td>15</td>
</tr>
<tr>
<td>US2002059233 (patent 110)</td>
<td>14</td>
</tr>
<tr>
<td>US2002065846 (patent 126)</td>
<td>15</td>
</tr>
<tr>
<td>US2002087593 (patent 97)</td>
<td>13</td>
</tr>
<tr>
<td>US2002091728 (patent 76)</td>
<td>11</td>
</tr>
<tr>
<td>US2002143730 (patent 109)</td>
<td>14</td>
</tr>
<tr>
<td>US2002143809 (patent 109)</td>
<td>14</td>
</tr>
<tr>
<td>US2002143811 (patent 109)</td>
<td>14</td>
</tr>
<tr>
<td>US2002143830 (patent 109)</td>
<td>14</td>
</tr>
<tr>
<td>US2002143831 (patent 109)</td>
<td>14</td>
</tr>
<tr>
<td>US2002174141 (patent 114)</td>
<td>14</td>
</tr>
<tr>
<td>US2002184260 (patent 117)</td>
<td>15</td>
</tr>
<tr>
<td>US2003009649 (patent 118)</td>
<td>15</td>
</tr>
<tr>
<td>US2003033329 (patent 120)</td>
<td>15</td>
</tr>
<tr>
<td>US2003056181 (patent 137)</td>
<td>16</td>
</tr>
<tr>
<td>US2003117447 (patent 128)</td>
<td>15</td>
</tr>
<tr>
<td>US2003120999 (patent 127)</td>
<td>15</td>
</tr>
<tr>
<td>US2003159108 (patent 149)</td>
<td>17</td>
</tr>
<tr>
<td>US2003164817 (patent 146)</td>
<td>7, 17</td>
</tr>
</tbody>
</table>
US2003182287 (patent 130), 15
US2003188258 (patent 142), 16
US2003212953 (patent 151), 17
US2003226105 (patent 153), 17
US2004044954 (patent 135), 16
US2004064470 (patent 155), 17
US2004080514 (patent 138), 16
US2004103365 (patent 145), 17
US2004111666 (patent 150), 17
US2004181748 (patent 147), 17
US2004205524 (patent 133), 16
US2004205676 (patent 109), 14
US2005081141 (patent 160), 18
US2005149482 (patent 186), 20
US2005172217 (patent 170), 19, 26, 29
US2005193379 (patent 189), 20, 22
US2005203935 (patent 167), 18
US2005210369 (patent 168), 18
US2005240984 (patent 171), 19
US2005268215 (patent 196), 18
US2006004843 (patent 197), 20, 21
US2006101391 (patent 223), 23
US2006222509 (patent 135), 29
US2006282818 (patent 243), 24
US2007022128 (patent 251), 25
US2007050697 (patent 254), 25
US2007058968 (patent 260), 25
US2007168323 (patent 282), 27
US2007168868 (patent 284), 27
US2007169206 (patent 285), 27
US2007185935 (patent 286), 27
US2007219956 (patent 288), 27
US2007220415 (patent 289), 27
US2007256004 (patent 293), 27
US2008016041 (patent 299), 28
US2008034281 (patent 301), 28, 36
US2008104498 (patent 304), 28
US2008126395 (patent 305), 28
US2008148140 (patent 306), 28
US2008168341 (patent 307), 28
US2008215959 (patent 313), 29
US2008222507 (patent 314), 29
US2008222510 (patent 316), 29
US2008276161 (patent 322), 29
US2008289490 (patent 323), 29
US2008301542 (patent 324), 29
US2009006466 (patent 325), 30
US2009069399 (patent 326), 30
US2009069397 (patent 330), 30
US2009086314 (patent 331), 30
US2009089067 (patent 333), 30
US2009089653 (patent 335), 30
US2009100325 (patent 336), 16, 30
US2009158139 (patent 343), 31
US2009160861 (patent 344), 31
US2009164880 (patent 345), 31
US2009172063 (patent 346), 31
US2009228776 (patent 348), 31
US2009282326 (patent 352), 31
US2009313537 (patent 355), 32
US2009319542 (patent 356), 32
US2010017698 (patent 360), 17, 32
US2010049565 (patent 361), 32
US2010049723 (patent 361), 32
US2010049745 (patent 361), 32
US2010049746 (patent 361), 32
US2010050230 (patent 361), 32
US2010050264 (patent 361), 32
US2010050265 (patent 361), 32
US2010050266 (patent 361), 32
US2010050267 (patent 361), 32
US2010050268 (patent 361), 32
US2010083090 (patent 367), 33
US2010083091 (patent 368), 33
US2010083092 (patent 368), 33
US2010095195 (patent 370), 33
US2010100803 (patent 371), 33
US2010107048 (patent 372), 33
US2010146434 (patent 374), 33
US2010174678 (patent 376), 33
US2010211862 (patent 381), 34
US2010287467 (patent 385), 34
US2010312748 (patent 387), 34
US2011022629 (patent 390), 34
US2011035652 (patent 392), 34
<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>US2011072340 (patent 393)</td>
<td>US2015026075 (patent 486)</td>
</tr>
<tr>
<td>US2011161796 (patent 395)</td>
<td>US2015032743 (patent 488)</td>
</tr>
<tr>
<td>US2011264993 (patent 399)</td>
<td>US2015095312 (patent 492)</td>
</tr>
<tr>
<td>US2011276888 (patent 401)</td>
<td>US2015113377 (patent 494)</td>
</tr>
<tr>
<td>US2011276870 (patent 402)</td>
<td>US2015120748 (patent 495)</td>
</tr>
<tr>
<td>US2011314365 (patent 404)</td>
<td>US2015161095 (patent 497)</td>
</tr>
<tr>
<td>US2012110428 (patent 408)</td>
<td>US2015169531 (patent 498)</td>
</tr>
<tr>
<td>US2012117452 (patent 409)</td>
<td>US2015169532 (patent 499)</td>
</tr>
<tr>
<td>US2012179956 (patent 416)</td>
<td>US2015254226 (patent 508)</td>
</tr>
<tr>
<td>US2012192052 (patent 417)</td>
<td>US2015261736 (patent 510)</td>
</tr>
<tr>
<td>US2013013994 (patent 423)</td>
<td>US2015309980 (patent 513)</td>
</tr>
<tr>
<td>US2013055057 (patent 425)</td>
<td>US2015317297 (patent 514)</td>
</tr>
<tr>
<td>US2013055058 (patent 426)</td>
<td>US2015324346 (patent 515)</td>
</tr>
<tr>
<td>US2013061122 (patent 427)</td>
<td>US2015331844 (patent 516)</td>
</tr>
<tr>
<td>US2013061123 (patent 428)</td>
<td>US2015370775 (patent 518)</td>
</tr>
<tr>
<td>US2013073940 (patent 430)</td>
<td>US2015378980 (patent 520)</td>
</tr>
<tr>
<td>US2013110884 (patent 433)</td>
<td>US2016004684 (patent 521)</td>
</tr>
<tr>
<td>US2013124957 (patent 435)</td>
<td>US2016019199 (patent 522)</td>
</tr>
<tr>
<td>US2013124959 (patent 436)</td>
<td>US2016019281 (patent 523)</td>
</tr>
<tr>
<td>US2013145244 (patent 439)</td>
<td>US2016026616 (patent 524)</td>
</tr>
<tr>
<td>US2013254157 (patent 444)</td>
<td>US2016055140 (patent 526)</td>
</tr>
<tr>
<td>US2013262974 (patent 445)</td>
<td>US2016062585 (patent 527)</td>
</tr>
<tr>
<td>US2013290822 (patent 447)</td>
<td>US2016124932 (patent 531)</td>
</tr>
<tr>
<td>US2013290823 (patent 448)</td>
<td>US2016154780 (patent 534)</td>
</tr>
<tr>
<td>US2013332811 (patent 450)</td>
<td>US2016162461 (patent 535)</td>
</tr>
<tr>
<td>US2013339832 (patent 451)</td>
<td>US2016173541 (patent 536)</td>
</tr>
<tr>
<td>US2014075278 (patent 452)</td>
<td>US2016188187 (patent 537)</td>
</tr>
<tr>
<td>US2014082470 (patent 453)</td>
<td>US2016196255 (patent 538)</td>
</tr>
<tr>
<td>US2014115434 (patent 454)</td>
<td>US2016196674 (patent 539)</td>
</tr>
<tr>
<td>US2014136936 (patent 455)</td>
<td>US2016210278 (patent 540)</td>
</tr>
<tr>
<td>US2014136937 (patent 456)</td>
<td>US2016224535 (patent 541)</td>
</tr>
<tr>
<td>US2014144886 (patent 457)</td>
<td>US2016224536 (patent 542)</td>
</tr>
<tr>
<td>US2014144986 (patent 461)</td>
<td>US2016261577 (patent 543)</td>
</tr>
<tr>
<td>US2014153708 (patent 462)</td>
<td>US2016275066 (patent 544)</td>
</tr>
<tr>
<td>US2014164686 (patent 464)</td>
<td>US2016321232 (patent 548)</td>
</tr>
<tr>
<td>US2014173400 (patent 465)</td>
<td>US2016334395 (patent 549)</td>
</tr>
<tr>
<td>US2014189483 (patent 466)</td>
<td>US2016342582 (patent 550)</td>
</tr>
<tr>
<td>US2014223276 (patent 468)</td>
<td>US2016350950 (patent 551)</td>
</tr>
<tr>
<td>US2014237339 (patent 471)</td>
<td>US2016378811 (patent 552)</td>
</tr>
<tr>
<td>US2014359417 (patent 474)</td>
<td>US2017060830 (patent 555)</td>
</tr>
<tr>
<td>US2014372850 (patent 475)</td>
<td>US2017075874 (patent 556)</td>
</tr>
<tr>
<td>US2014372851 (patent 476)</td>
<td>US2017091166 (patent 557)</td>
</tr>
<tr>
<td>US2014372852 (patent 477)</td>
<td>US2017097925 (patent 558)</td>
</tr>
<tr>
<td>US2014372856 (patent 478)</td>
<td>US2017116171 (patent 559)</td>
</tr>
<tr>
<td>US2014372858 (patent 479)</td>
<td>US2017124045 (patent 565)</td>
</tr>
<tr>
<td>US2014372932 (patent 480)</td>
<td>US2017124047 (patent 564)</td>
</tr>
<tr>
<td>US2014372933 (patent 481)</td>
<td>US2017124052 (patent 560)</td>
</tr>
<tr>
<td>US2014372952 (patent 482)</td>
<td>US2017124055 (patent 563)</td>
</tr>
<tr>
<td>US2014380139 (patent 483)</td>
<td>US2017124058 (patent 561)</td>
</tr>
<tr>
<td>Patent Number</td>
<td>Index</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------</td>
</tr>
<tr>
<td>US2017124142</td>
<td>56</td>
</tr>
<tr>
<td>US2017132195</td>
<td>46</td>
</tr>
<tr>
<td>US2017132196</td>
<td>46</td>
</tr>
<tr>
<td>US2017139893</td>
<td>46</td>
</tr>
<tr>
<td>US2017161249</td>
<td>46</td>
</tr>
<tr>
<td>US2017161250</td>
<td>46</td>
</tr>
<tr>
<td>US2017161251</td>
<td>46</td>
</tr>
<tr>
<td>US2017199728</td>
<td>46</td>
</tr>
<tr>
<td>US2017200661</td>
<td>46</td>
</tr>
<tr>
<td>US2017220543</td>
<td>46</td>
</tr>
<tr>
<td>US2017228357</td>
<td>47</td>
</tr>
<tr>
<td>US2017228358</td>
<td>47</td>
</tr>
<tr>
<td>US2017242837</td>
<td>47</td>
</tr>
<tr>
<td>US2017242838</td>
<td>47</td>
</tr>
<tr>
<td>US2017249295</td>
<td>47</td>
</tr>
<tr>
<td>US2017255608</td>
<td>47</td>
</tr>
<tr>
<td>US2017262425</td>
<td>47</td>
</tr>
<tr>
<td>US2017300222</td>
<td>47</td>
</tr>
<tr>
<td>US2017300466</td>
<td>47</td>
</tr>
<tr>
<td>US2017300467</td>
<td>47</td>
</tr>
<tr>
<td>US2017308617</td>
<td>47</td>
</tr>
<tr>
<td>US2017329984</td>
<td>47</td>
</tr>
<tr>
<td>US2017337174</td>
<td>48</td>
</tr>
<tr>
<td>US2017337175</td>
<td>47</td>
</tr>
<tr>
<td>US2017337233</td>
<td>47</td>
</tr>
<tr>
<td>US2017337238</td>
<td>47</td>
</tr>
<tr>
<td>US2017351688</td>
<td>48</td>
</tr>
<tr>
<td>US2018004722</td>
<td>48</td>
</tr>
<tr>
<td>US2018005122</td>
<td>48</td>
</tr>
<tr>
<td>US2018024981</td>
<td>48</td>
</tr>
<tr>
<td>US2018032498</td>
<td>48</td>
</tr>
<tr>
<td>US2018039613</td>
<td>48</td>
</tr>
<tr>
<td>US2018046608</td>
<td>48</td>
</tr>
<tr>
<td>US4398249</td>
<td>5</td>
</tr>
<tr>
<td>US5021973</td>
<td>6</td>
</tr>
<tr>
<td>US5033009</td>
<td>5</td>
</tr>
<tr>
<td>US5055998</td>
<td>5</td>
</tr>
<tr>
<td>US5093907</td>
<td>6</td>
</tr>
<tr>
<td>US5121499</td>
<td>6</td>
</tr>
<tr>
<td>US5303146</td>
<td>6, 7, 9</td>
</tr>
<tr>
<td>US5317686</td>
<td>6</td>
</tr>
<tr>
<td>US5339410</td>
<td>6</td>
</tr>
<tr>
<td>US5371675</td>
<td>6</td>
</tr>
<tr>
<td>US5396621</td>
<td>7</td>
</tr>
<tr>
<td>US5418902</td>
<td>7</td>
</tr>
<tr>
<td>US5437006</td>
<td>7</td>
</tr>
<tr>
<td>US5499180</td>
<td>7</td>
</tr>
<tr>
<td>US5532715</td>
<td>7</td>
</tr>
<tr>
<td>US5552537</td>
<td>7, 8</td>
</tr>
<tr>
<td>US5581678</td>
<td>8</td>
</tr>
<tr>
<td>US5590259</td>
<td>8</td>
</tr>
<tr>
<td>US5598519</td>
<td>8</td>
</tr>
<tr>
<td>US5603021</td>
<td>8</td>
</tr>
<tr>
<td>US5604854</td>
<td>8</td>
</tr>
<tr>
<td>US5613131</td>
<td>8</td>
</tr>
<tr>
<td>US5661298</td>
<td>8</td>
</tr>
<tr>
<td>US5685001</td>
<td>8</td>
</tr>
<tr>
<td>US5717939</td>
<td>8</td>
</tr>
<tr>
<td>US5721847</td>
<td>8</td>
</tr>
<tr>
<td>US5734889</td>
<td>8</td>
</tr>
<tr>
<td>US5742835</td>
<td>8</td>
</tr>
<tr>
<td>US5752253</td>
<td>8</td>
</tr>
<tr>
<td>US5761589</td>
<td>8</td>
</tr>
<tr>
<td>US5768158</td>
<td>8</td>
</tr>
<tr>
<td>US5799295</td>
<td>8</td>
</tr>
<tr>
<td>US5819293</td>
<td>8</td>
</tr>
<tr>
<td>US5842180</td>
<td>8</td>
</tr>
<tr>
<td>US5845300</td>
<td>8</td>
</tr>
<tr>
<td>US5848187</td>
<td>8</td>
</tr>
<tr>
<td>US5867150</td>
<td>8</td>
</tr>
<tr>
<td>US5880742</td>
<td>8</td>
</tr>
<tr>
<td>US5881381</td>
<td>8</td>
</tr>
<tr>
<td>US5883623</td>
<td>8</td>
</tr>
<tr>
<td>US5890174</td>
<td>8</td>
</tr>
<tr>
<td>US5893123</td>
<td>8</td>
</tr>
<tr>
<td>US5926822</td>
<td>8</td>
</tr>
<tr>
<td>US5966716</td>
<td>8</td>
</tr>
<tr>
<td>US5970506</td>
<td>8</td>
</tr>
<tr>
<td>US5987481</td>
<td>8</td>
</tr>
<tr>
<td>US6002865</td>
<td>8</td>
</tr>
<tr>
<td>US6005573</td>
<td>8</td>
</tr>
<tr>
<td>US6006239</td>
<td>8</td>
</tr>
<tr>
<td>US6055548</td>
<td>8, 12</td>
</tr>
<tr>
<td>Patent Number</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
</tr>
<tr>
<td>US6057837</td>
<td>(patent 66)</td>
</tr>
<tr>
<td>US6112214</td>
<td>(patent 60)</td>
</tr>
<tr>
<td>US6115759</td>
<td>(patent 68)</td>
</tr>
<tr>
<td>US6138130</td>
<td>(patent 70)</td>
</tr>
<tr>
<td>US6166739</td>
<td>(patent 82)</td>
</tr>
<tr>
<td>US6185582</td>
<td>(patent 72)</td>
</tr>
<tr>
<td>US619078</td>
<td>(patent 77)</td>
</tr>
<tr>
<td>US6256649</td>
<td>(patent 71)</td>
</tr>
<tr>
<td>US6282551</td>
<td>(patent 74)</td>
</tr>
<tr>
<td>US6286017</td>
<td>(patent 57)</td>
</tr>
<tr>
<td>US6317750</td>
<td>(patent 79)</td>
</tr>
<tr>
<td>US6317758</td>
<td>(patent 69)</td>
</tr>
<tr>
<td>US6411313</td>
<td>(patent 83)</td>
</tr>
<tr>
<td>US6411959</td>
<td>(patent 88)</td>
</tr>
<tr>
<td>US6430584</td>
<td>(patent 92)</td>
</tr>
<tr>
<td>US6438565</td>
<td>(patent 48)</td>
</tr>
<tr>
<td>US6460059</td>
<td>(patent 75)</td>
</tr>
<tr>
<td>US6496832</td>
<td>(patent 78)</td>
</tr>
<tr>
<td>US6523167</td>
<td>(patent 89)</td>
</tr>
<tr>
<td>US6549878</td>
<td>(patent 80)</td>
</tr>
<tr>
<td>US6592626</td>
<td>(patent 87)</td>
</tr>
<tr>
<td>US6626959</td>
<td>(patent 84)</td>
</tr>
<tr>
<td>US6631497</td>
<td>(patent 86)</td>
</tr>
<tr>
<td>US6640234</td>
<td>(patent 81)</td>
</tr>
<tr>
<td>US6701485</td>
<td>(patent 85)</td>
</tr>
<tr>
<td>US6725422</td>
<td>(patent 93)</td>
</tr>
<tr>
<td>US6742162</td>
<td>(patent 109)</td>
</tr>
<tr>
<td>US6757867</td>
<td>(patent 95)</td>
</tr>
<tr>
<td>US6763498</td>
<td>(patent 105)</td>
</tr>
<tr>
<td>US6765009</td>
<td>(patent 91)</td>
</tr>
<tr>
<td>US676512</td>
<td>(patent 94)</td>
</tr>
<tr>
<td>US6779151</td>
<td>(patent 100)</td>
</tr>
<tr>
<td>US6883161</td>
<td>(patent 102)</td>
</tr>
<tr>
<td>US6898760</td>
<td>(patent 99)</td>
</tr>
<tr>
<td>US6907428</td>
<td>(patent 123)</td>
</tr>
<tr>
<td>US6912690</td>
<td>(patent 115)</td>
</tr>
<tr>
<td>US6948154</td>
<td>(patent 90)</td>
</tr>
<tr>
<td>US6961898</td>
<td>(patent 109)</td>
</tr>
<tr>
<td>US6988241</td>
<td>(patent 200)</td>
</tr>
<tr>
<td>US7000181</td>
<td>(patent 116)</td>
</tr>
<tr>
<td>US7007033</td>
<td>(patent 209)</td>
</tr>
<tr>
<td>US7010779</td>
<td>(patent 134)</td>
</tr>
<tr>
<td>US7047484</td>
<td>(patent 224)</td>
</tr>
<tr>
<td>US7082569</td>
<td>(patent 129)</td>
</tr>
<tr>
<td>US7099890</td>
<td>(patent 175)</td>
</tr>
<tr>
<td>US7107519</td>
<td>(patent 237)</td>
</tr>
<tr>
<td>US7117430</td>
<td>(patent 107)</td>
</tr>
<tr>
<td>US7120866</td>
<td>(patent 182)</td>
</tr>
<tr>
<td>US7127672</td>
<td>(patent 241)</td>
</tr>
<tr>
<td>US7143338</td>
<td>(patent 108)</td>
</tr>
<tr>
<td>US7146561</td>
<td>(patent 113)</td>
</tr>
<tr>
<td>US7155665</td>
<td>(patent 246)</td>
</tr>
<tr>
<td>US7155667</td>
<td>(patent 245)</td>
</tr>
<tr>
<td>US7177855</td>
<td>(patent 163)</td>
</tr>
<tr>
<td>US7178098</td>
<td>(patent 112)</td>
</tr>
<tr>
<td>US7197696</td>
<td>(patent 266)</td>
</tr>
<tr>
<td>US7206997</td>
<td>(patent 96)</td>
</tr>
<tr>
<td>US7222294</td>
<td>(patent 159)</td>
</tr>
<tr>
<td>US7225189</td>
<td>(patent 270)</td>
</tr>
<tr>
<td>US7231593</td>
<td>(patent 273)</td>
</tr>
<tr>
<td>US7233951</td>
<td>(patent 278)</td>
</tr>
<tr>
<td>US7233956</td>
<td>(patent 158)</td>
</tr>
<tr>
<td>US7237186</td>
<td>(patent 139)</td>
</tr>
<tr>
<td>US7249316</td>
<td>(patent 226)</td>
</tr>
<tr>
<td>US7251776</td>
<td>(patent 132)</td>
</tr>
<tr>
<td>US7266763</td>
<td>(patent 144)</td>
</tr>
<tr>
<td>US7272783</td>
<td>(patent 111)</td>
</tr>
<tr>
<td>US7275207</td>
<td>(patent 141)</td>
</tr>
<tr>
<td>US7296219</td>
<td>(patent 296)</td>
</tr>
<tr>
<td>US7299223</td>
<td>(patent 174)</td>
</tr>
<tr>
<td>US7299406</td>
<td>(patent 194)</td>
</tr>
<tr>
<td>US7305408</td>
<td>(patent 157)</td>
</tr>
<tr>
<td>US7318192</td>
<td>(patent 298)</td>
</tr>
<tr>
<td>US7346485</td>
<td>(patent 164)</td>
</tr>
<tr>
<td>US7350141</td>
<td>(patent 177)</td>
</tr>
<tr>
<td>US7370271</td>
<td>(patent 148)</td>
</tr>
<tr>
<td>US7392478</td>
<td>(patent 165)</td>
</tr>
<tr>
<td>US7412645</td>
<td>(patent 172)</td>
</tr>
<tr>
<td>US7415481</td>
<td>(patent 212)</td>
</tr>
<tr>
<td>US7415664</td>
<td>(patent 166)</td>
</tr>
<tr>
<td>US7418460</td>
<td>(patent 217)</td>
</tr>
<tr>
<td>US7421646</td>
<td>(patent 312)</td>
</tr>
<tr>
<td>US7424688</td>
<td>(patent 244)</td>
</tr>
<tr>
<td>US7426688</td>
<td>(patent 221)</td>
</tr>
<tr>
<td>US7444584</td>
<td>(patent 321)</td>
</tr>
<tr>
<td>US7451397</td>
<td>(patent 230)</td>
</tr>
<tr>
<td>US7454471</td>
<td>(patent 204)</td>
</tr>
<tr>
<td>US7467148</td>
<td>(patent 187)</td>
</tr>
<tr>
<td>US7467350</td>
<td>(patent 140)</td>
</tr>
<tr>
<td>US7472339</td>
<td>(patent 119)</td>
</tr>
<tr>
<td>US7484170</td>
<td>(patent 154)</td>
</tr>
<tr>
<td>US7506242</td>
<td>(patent 245)</td>
</tr>
<tr>
<td>US7509571</td>
<td>(patent 98)</td>
</tr>
<tr>
<td>US7512654</td>
<td>(patent 185)</td>
</tr>
<tr>
<td>US7523390</td>
<td>(patent 183)</td>
</tr>
<tr>
<td>US7530012</td>
<td>(patent 152)</td>
</tr>
<tr>
<td>US7533139</td>
<td>(patent 211)</td>
</tr>
<tr>
<td>US7546521</td>
<td>(patent 188)</td>
</tr>
<tr>
<td>Patent Number</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
</tr>
<tr>
<td>US7546523</td>
<td>(patent 143)</td>
</tr>
<tr>
<td>US7549117</td>
<td>(patent 193)</td>
</tr>
<tr>
<td>US7565371</td>
<td>(patent 267)</td>
</tr>
<tr>
<td>US7581168</td>
<td>(patent 233)</td>
</tr>
<tr>
<td>US7590944</td>
<td>(patent 240)</td>
</tr>
<tr>
<td>US7594165</td>
<td>(patent 234)</td>
</tr>
<tr>
<td>US7612776</td>
<td>(patent 136)</td>
</tr>
<tr>
<td>US7617443</td>
<td>(patent 156)</td>
</tr>
<tr>
<td>US7624372</td>
<td>(patent 353)</td>
</tr>
<tr>
<td>US7640489</td>
<td>(patent 122)</td>
</tr>
<tr>
<td>US7640490</td>
<td>(patent 232)</td>
</tr>
<tr>
<td>US7640493</td>
<td>(patent 236)</td>
</tr>
<tr>
<td>US7650355</td>
<td>(patent 359)</td>
</tr>
<tr>
<td>US7650576</td>
<td>(patent 131)</td>
</tr>
<tr>
<td>US7664804</td>
<td>(patent 195)</td>
</tr>
<tr>
<td>US7665013</td>
<td>(patent 222)</td>
</tr>
<tr>
<td>US7673227</td>
<td>(patent 178)</td>
</tr>
<tr>
<td>US7685152</td>
<td>(patent 280)</td>
</tr>
<tr>
<td>US7693860</td>
<td>(patent 238)</td>
</tr>
<tr>
<td>US7698287</td>
<td>(patent 214)</td>
</tr>
<tr>
<td>US7702997</td>
<td>(patent 181)</td>
</tr>
<tr>
<td>US7702998</td>
<td>(patent 332)</td>
</tr>
<tr>
<td>US7707486</td>
<td>(patent 208)</td>
</tr>
<tr>
<td>US7743316</td>
<td>(patent 250)</td>
</tr>
<tr>
<td>US7752536</td>
<td>(patent 263)</td>
</tr>
<tr>
<td>US7756824</td>
<td>(patent 338)</td>
</tr>
<tr>
<td>US7761403</td>
<td>(patent 162)</td>
</tr>
<tr>
<td>US7761782</td>
<td>(patent 377)</td>
</tr>
<tr>
<td>US7770110</td>
<td>(patent 378)</td>
</tr>
<tr>
<td>US7779431</td>
<td>(patent 201)</td>
</tr>
<tr>
<td>US7783966</td>
<td>(patent 290)</td>
</tr>
<tr>
<td>US7792814</td>
<td>(patent 269)</td>
</tr>
<tr>
<td>US7792847</td>
<td>(patent 265)</td>
</tr>
<tr>
<td>US7793210</td>
<td>(patent 103)</td>
</tr>
<tr>
<td>US7805674</td>
<td>(patent 249)</td>
</tr>
<tr>
<td>US7809712</td>
<td>(patent 262)</td>
</tr>
<tr>
<td>US7810032</td>
<td>(patent 227)</td>
</tr>
<tr>
<td>US7818661</td>
<td>(patent 351)</td>
</tr>
<tr>
<td>US7836425</td>
<td>(patent 247)</td>
</tr>
<tr>
<td>US7840889</td>
<td>(patent 318)</td>
</tr>
<tr>
<td>US7853867</td>
<td>(patent 173)</td>
</tr>
<tr>
<td>US7853868</td>
<td>(patent 259)</td>
</tr>
<tr>
<td>US7877678</td>
<td>(patent 258)</td>
</tr>
<tr>
<td>US7882427</td>
<td>(patent 297)</td>
</tr>
<tr>
<td>US7895511</td>
<td>(patent 320)</td>
</tr>
<tr>
<td>US7904800</td>
<td>(patent 202)</td>
</tr>
<tr>
<td>US7908549</td>
<td>(patent 276)</td>
</tr>
<tr>
<td>US7917841</td>
<td>(patent 287)</td>
</tr>
<tr>
<td>US7930626</td>
<td>(patent 161)</td>
</tr>
<tr>
<td>US7933862</td>
<td>(patent 213)</td>
</tr>
<tr>
<td>US7945593</td>
<td>(patent 281)</td>
</tr>
<tr>
<td>US7971134</td>
<td>(patent 125)</td>
</tr>
<tr>
<td>US7984371</td>
<td>(patent 253)</td>
</tr>
<tr>
<td>US7991804</td>
<td>(patent 206)</td>
</tr>
<tr>
<td>US8006174</td>
<td>(patent 327)</td>
</tr>
<tr>
<td>US8006175</td>
<td>(patent 340)</td>
</tr>
<tr>
<td>US8015481</td>
<td>(patent 190)</td>
</tr>
<tr>
<td>US8032821</td>
<td>(patent 295)</td>
</tr>
<tr>
<td>US8051373</td>
<td>(patent 229)</td>
</tr>
<tr>
<td>US8082489</td>
<td>(patent 292)</td>
</tr>
<tr>
<td>US8086959B2</td>
<td>(patent 228)</td>
</tr>
<tr>
<td>US8099370</td>
<td>(patent 319)</td>
</tr>
<tr>
<td>US8103951</td>
<td>(patent 369)</td>
</tr>
<tr>
<td>US8108466</td>
<td>(patent 350)</td>
</tr>
<tr>
<td>US8122340</td>
<td>(patent 365)</td>
</tr>
<tr>
<td>US8140549</td>
<td>(patent 337)</td>
</tr>
<tr>
<td>US8140958</td>
<td>(patent 308)</td>
</tr>
<tr>
<td>US8145990</td>
<td>(patent 357)</td>
</tr>
<tr>
<td>US8161372</td>
<td>(patent 275)</td>
</tr>
<tr>
<td>US8166385</td>
<td>(patent 362)</td>
</tr>
<tr>
<td>US8185817</td>
<td>(patent 358)</td>
</tr>
<tr>
<td>US8190987</td>
<td>(patent 339)</td>
</tr>
<tr>
<td>US8205149</td>
<td>(patent 101)</td>
</tr>
<tr>
<td>US8209308</td>
<td>(patent 294)</td>
</tr>
<tr>
<td>US8209661</td>
<td>(patent 134)</td>
</tr>
<tr>
<td>US8230321</td>
<td>(patent 379)</td>
</tr>
<tr>
<td>US8232994</td>
<td>(patent 303)</td>
</tr>
<tr>
<td>US8234293</td>
<td>(patent 261)</td>
</tr>
<tr>
<td>US8250461</td>
<td>(patent 328)</td>
</tr>
<tr>
<td>US8255789</td>
<td>(patent 366)</td>
</tr>
<tr>
<td>US8271519</td>
<td>(patent 407)</td>
</tr>
<tr>
<td>US8275974</td>
<td>(patent 272)</td>
</tr>
<tr>
<td>US8301993</td>
<td>(patent 309)</td>
</tr>
<tr>
<td>US8307119</td>
<td>(patent 291)</td>
</tr>
<tr>
<td>US8321780</td>
<td>(patent 317)</td>
</tr>
<tr>
<td>US8335981</td>
<td>(patent 391)</td>
</tr>
<tr>
<td>US8365066</td>
<td>(patent 397)</td>
</tr>
<tr>
<td>US8369616</td>
<td>(patent 375)</td>
</tr>
<tr>
<td>US8407579</td>
<td>(patent 394)</td>
</tr>
<tr>
<td>US8407668</td>
<td>(patent 341)</td>
</tr>
<tr>
<td>US8468442</td>
<td>(patent 398)</td>
</tr>
<tr>
<td>US8473837</td>
<td>(patent 386)</td>
</tr>
<tr>
<td>US8499290</td>
<td>(patent 403)</td>
</tr>
<tr>
<td>US8527865</td>
<td>(patent 354)</td>
</tr>
<tr>
<td>US8527866</td>
<td>(patent 400)</td>
</tr>
<tr>
<td>US8549392</td>
<td>(patent 256)</td>
</tr>
<tr>
<td>US8578399</td>
<td>(patent 349)</td>
</tr>
<tr>
<td>US8583530</td>
<td>(patent 420)</td>
</tr>
</tbody>
</table>
Index

US8584003 (patent 271), 19, 26
US8584150 (patent 384), 21, 34
US8589783 (patent 396), 35
US8601360 (patent 429), 37
US8601383 (patent 264), 25, 45
US8607138 (patent 231), 20
US8621340 (patent 231), 23, 39
US8640022 (patent 440), 38
US9280533 (patent 446), 27, 38
US9286342 (patent 528), 43
US9289454 (patent 493), 41
US9298687 (patent 411), 36
US9298688 (patent 529), 41, 43, 45
US9305176 (patent 506), 42
US9311289 (patent 530), 43
US9311371 (patent 443), 38
US9316222 (patent 503), 42
US9317495 (patent 424), 31, 36
US9323735 (patent 191), 20
US9330080 (patent 422), 36
US9330090 (patent 467), 39
US9342496 (patent 329), 30
US9342497 (patent 532), 44
US9367535 (patent 459), 39
US9384182 (patent 484), 34, 40
US9384182 (patent 485), 34, 40
US9384183 (patent 487), 34, 40
US9384184 (patent 487), 34, 40
US9384185 (patent 487), 34, 40
US9348358 (patent 512), 42
US93501463 (patent 274), 26
US93514116 (patent 517), 43
US93552283 (patent 511), 42
US93552348 (patent 519), 43
US93575950 (patent 463), 39
US93582288 (patent 554), 31, 45
US93652446 (patent 525), 43
US93697193 (patent 509), 42
US93703767 (patent 458), 39
US93720897 (patent 505), 42
US93727550 (patent 549), 45
US93734139 (patent 248), 24
US93740676 (patent 490), 41
US93753908 (patent 342), 31
US93792273 (patent 469), 24, 39
US93798889 (patent 586), 47
US93811516 (patent 413), 36
US93817876 (patent 553), 45
US93818313 (patent 283), 27
US93824081 (patent 547), 45
US93842099 (patent 460), 39
US93852121 (patent 502), 42
US93864812 (patent 507), 26, 42
US93870354 (patent 491), 29, 41
US93875226 (patent 596), 48
US9880993 (patent 533), 44
Index

US9892108 (patent 600), 48

Valsa, Ranjit, 42
Vayssiere, Julien, 28
Velingkar, Amit, 37
Villard, Jr Bruce, 45
Viry, Patrick, 38
Vogel, Matthew, 43
Voshell, Perlie, 15, 26
Vrba, Joseph, 7
Wachter, Kai, 23
Wad, Rohit, 9
Waite, David, 44
Waldau, Mattias, 17
Waldman, Lawrence, 38, 43
Walker, Keith, 24
Wallace, Robert, 34
Wang, Dong, 40
Wang, Hui, 41
Ward, R, 44
Warren, David, 33
Waymire, Elisabeth, 7
Weber, Brandon, 23–25
Webster, Steven, 24
Wedekind, Gerald, 30
Weitzman, Louis, 25
West, Vincent, 7
Whelan, Mark, 27, 36
Will IV, Henry, 45
Williams, David Jr, 9, 10, 12
Williamson, Chris, 35
Winterstein, Daniel, 36
Wisniewski, Robert, 11
Witkowski, Andrew, 18, 25
Wizcell implementation, 14
Woloshin, Murray, 12
Woodley, Ronald, 19
Woods, Roberto, 46
Wright, Terrence, 5

Xia, Huang, 48
Xue, Wei, 34

Yamaguchi, Tomoharu, 9
Yamashita, Akio, 8
Yang, Xiaohong, 22
Yasue, Toshiaki, 48
Ying, Rui, 25

Young, Brian, 35
Yousaf, Timothy, 48
Zaks, Gerald, 8
Zeller, Rudolf, 26
Zellweger, Polle, 11
Zia, Khurram, 46
Zorn, Benjamin, 47