

1) Family number: 28241241 (US2002087590A)

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Title: CONCURRENT COLLECTION OF CYCLIC GARBAGE IN REFERENCE COUNTING SYSTEMS
Priority: US20000254615P 20001211 US20000254691P 20001211 US20010011051 20011207
US20010013148 20011210 US20070695323 20070402 US20080129110 20080529
US20120363811 20120201

Family:	Publication number	Publication date	Application number	Application date
	US2002087590 AA	20020704	US20010013148	20011210
	US2002107880 AA	20020808	US20010011051	20011207
	US2007185943 AA	20070809	US20070695323	20070402
	US2008235309 AA	20080925	US20080129110	20080529
	US2012131070 AA	20120524	US20120363811	20120201
	US6879991 BB	20050412	US20010011051	20011207
	US7216136 BB	20070508	US20010013148	20011210
	US8126940 BB	20120228	US20080129110	20080529
	US8782104 BB	20140715	US20120363811	20120201

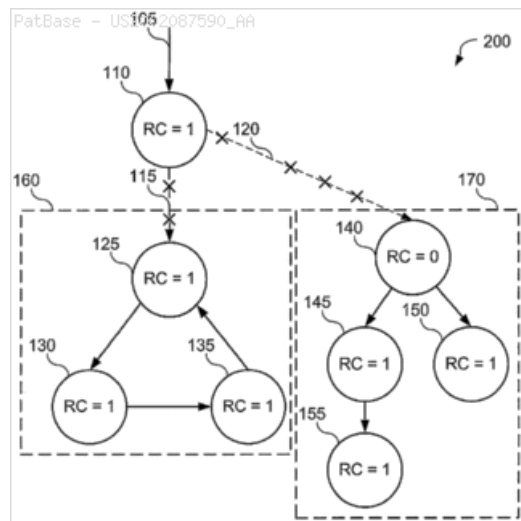
Probable Assignee: IBM
Assignee(s):(std): BACON DAVID FRANCIS ; IBM ; RAJAN VADAKKEDATHU THOMAS
Assignee(s): INT BUSINESS MACHINES CORP
Inventor(s):(std): BACON DAVID FRANCIS ; BACON DAVID F ; RAJAN VADAKKEDATHU T ; RAJAN VADAKKEDATHU THOMAS
Agent(s): RYAN MASON AND LEWIS LLP; CASEY P
International class (IPC 8-9): G06F12/02 G06F17/30 G06F7/00 (Advanced/Invention); G06F12/02 G06F17/30 G06F7/00 (Core/Invention)
International class (IPC 1-7): G06F17/30 G06F7/00
CPC: Y10S707/99938 Y10S707/99957 G06F12/0261
European class: G06F12/02D2G2
US class: 1/1 1/1P 707/206 707/8 707/813 707/814 707/814S 707/815 707/815P 707/999.008 707/999.206 707/999.206S 707/E17.001 707/E17.001S 707/E17.005 707/E17.005S 711/E12.01 711/E12.010S

[Classification Explorer](#)

Cited documents: US6760736 BB, US6704756 BB, US6638315 BB, US6594678 BA, US6473773 BA, US6434577 BA, US6393440 BA, US6363403 BA, US6339779 BA, US6314436 BA, US6308185 BA, US6115782 A, US6052699 A, US5920876 A, US5900001 A, US5873105 A, US5241673 A, US4775932 A, US4695949 A,

Forward Citations: WO16003412, WO14201270, US9985829, US9940234, US9934242, US9904597, US9846553, US9830324, US9774582, US9720819, US9715521, US9628438, US9613073, US9552382, US9542423, US9514137, US9483365, US9465696, US9411687, US9317369, US9176871, US9053017, US8943109, US8868862, US8868859, US8819471, US8689034, US8601036, US8527558, US8499010, US8478738, US8396904, US8156494, US8140597, US8103706, US8095885, US8056055, US7844632, US7769792, US7756906, US7693919, US7631024, US7596569, US7565386, US7500252, US7404182, US7315873, US2016364177, US2016283372, US2015234876, US2014115291, US2013173876, US2012317586, US2012246204, US2010185632, US2009150465, US2009094301, US2009094300, US2009063594, US2009006507, US2008307174, US2008098412, US2008098186, US2008098002, US2008034022, US2008005164, US2007226281, US2007198617, US2007162527, US2007022149, US2006085433, US2005015417, US2004181562, US10474654, US10248556, US10223257, US10223163, US10120889, US10083113, US10073770, TWI455029, EP2754054, EP2754054, EP2754054, EP1387273, EP1387273, CN104054058, CN104054058, CN102999328, CN102999328,

Abstract:
The present invention provides techniques that allow concurrent collection of cyclic garbage on reference counting systems. In general, candidate objects are found that may be part of cyclic garbage. Each candidate object has a reference count. Two tests are performed to determine if concurrent operations have affected the reference counts of the candidate objects. If concurrent operations have not affected the reference counts, the candidate objects are collected as garbage. Additionally, during garbage collection, the decrements to reference counts are delayed so that increments occur before decrements and so that decrements are held a predetermined time before being applied. This prevents decrementing a reference count and collecting a cycle as garbage right before a reference is added to an object in the cycle.



2) Family number: 68242266 (US2018018206A)

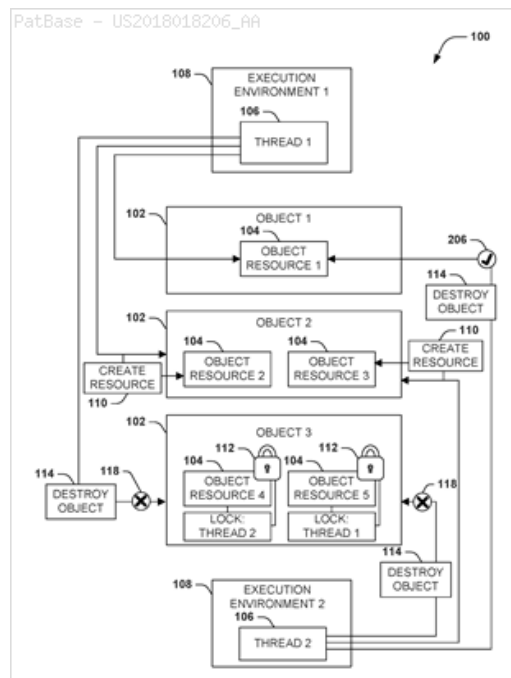
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Title: WORKFLOW-BASED OBJECT DESTRUCTION
Priority: US20160210864 20160714 WO2017US40570 20170703
Family:

Publication number	Publication date	Application number	Application date
AU2017295814 AA	20181220	AU20170295814	20170703
BR112018077371 A2	20190716	BR20181177371	20170703
CA3029992 AA	20190104	CA20173029992	20170703
CL2019000006 A1	20190426	CL20190000006	20190102
CN109478148 A	20190315	CN201780043161	20170703
CO20180014030 A2	20190118	CO20180014030	20181221
EP3485375 A1	20190522	EP20170739822	20170703
ID201901173 A	20190215	ID2019P0000241	20170703
IL264145 A0	20190228	IL20170264145	20170703
IN201847045418 A	20190308	IN201847045418	20181130
JP2019525321 T2	20190905	JP20190500824T	20170703
KR20190027823 A	20190315	KR20197001359	20170703
MX2019000541 A1	20190704	MX20190000541	20170703
PH2018550216 A	20191028	PH20180550216	20181228
SG11201900010Q A1	20190130	SG20191100010	20170703
US2018018206 AA	20180118	US20160210864	20160714
US10223163 BB	20190305	US20160210864	20160714
WO18013377 A1	20180118	WO2017US40570	20170703

Probable Assignee: MICROSOFT CORP
Assignee(s):(std): MICROSOFT CORP ; MICROSOFT TECHNOLOGY LICENSING LLC
Assignee(s): STALL JEFFREY EVAN
Inventor(s):(std): STALL JEFFREY EVAN ; JEFFREY EVAN STALL
Agent(s): DAVIES COLLISON CAVE PTY LTD; SMART AND BIGGAR; ESTUDIO VILLASECA Y CIA; CMS CAMERON MCKENNA NABARRO OLSWANG LLP; LANNY SETIAWAN MBA MGMT MA LPC MA LMFT; INABA YOSHIYUKI; BUCKLEY MASCHOFF AND TALWALKAR LLC; MINHAS SANDIP ET AL
Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DJ DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU IE IL IN IR IS IT JO JP KE KG KH KN KP KR KW KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW
International class (IPC 8-9): G06F G06F12/02 G06F9/50 G06F9/52 (Advanced/Invention); G06F (Subclass/Invention)
International class (IPC 1-7): G06F12/02 G06F9/50
CPC: G06F9/5022 G06F12/0261 G06F2212/1024 G06F2212/1032 G06F9/52 G06F12/0269 G06F12/0253 G06F12/0276
US class: 1/1 718/106
[Classification Explorer](#)
Cited documents: WO0057277 A1, US7376683 BA, US7237237 BB, US6681263 BA, US6496864 BA, US6473773 BA, US6363403 BA, US6230213 BA, US5398334 A, US2015269196 AA, US2013275941 AA, US2012197944 AA, US2007203960 AA, US2005028140 AA, US2002087590 AA,

Abstract:
Objects in a computing environment are often utilized by threads through an object lifecycle, and are destroyed at the end of the object lifecycle to reclaim the computing resources used by the object. In some cases, a thread that initiates an object destruction of an object may be unable to complete the destruction (e.g., a second thread may hold a synchronization lock over an object resource of the object). An object destruction workflow initiates the destruction of an object on behalf of a thread. If the object destruction workflow encounters a failure to complete the object destruction, a new reference to the object is inserted into an object destruction list, as the last reference to the object. A second thread discovers and releases the last reference in the object destruction list, prompting the object destruction workflow to resume the attempt to destroy the object on behalf of the second thread.



3) Family number: 26937344 (US6275857B)

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Title: SYSTEM AND METHOD FOR FREEING SHARED RESOURCES IN A COMPUTER SYSTEM

Priority: US19960741474 19961030 US19980222062 19981229

Family:	Publication number	Publication date	Application number	Application date
	US6275857 BA	20010814	US19960741474	19961030
	US6496864 BA	20021217	US19980222062	19981229

Probable Assignee: MICROSOFT CORP

Assignee(s):(std): MICROSOFT CORP

Assignee(s): MICROSOFT ONE MICROSOFT WAYREDMOND WASHINGTON ; MICROSOFT TECHNOLOGY LICENSING LLC ; MICROSOFT

Inventor(s):(std): MCCARTNEY COLIN

International class G06F12/02 G06F9/48 G06F9/50 (Advanced/Invention);
(IPC 8-9): G06F12/02 G06F9/46 (Core/Invention)

International class G06F12/00 G06F13/14
(IPC 1-7):

CPC: Y10S707/99953 Y10S707/99956 G06F9/4843 G06F12/0253 G06F9/5022

European class: G06F12/02D2G G06F9/46C4 G06F9/48C4 G06F9/50

US class: 707/205 707/206 707/999.202 707/999.205 709/104 709/205 709/206 709/223 709/226 709/238 709/239 711/E12.009 718/104

[Classification Explorer](#)

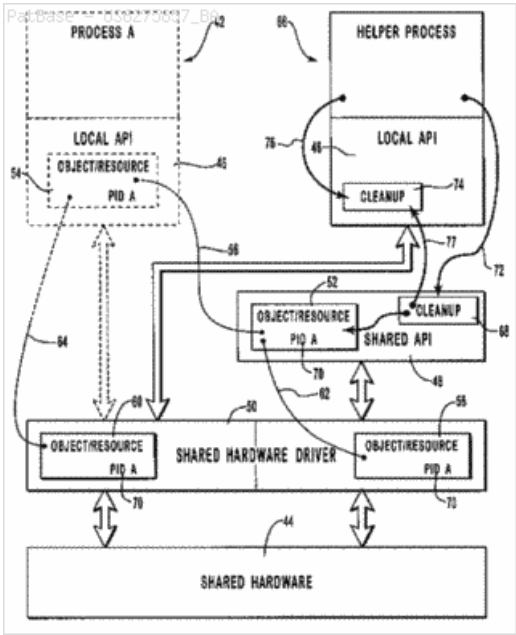
Cited documents: WO9922294 A1, WO9505634 A2, US6279124 BA, US6275857 BA, US6081813 A, US5982891 A, US5832529 A, US5819019 A, US5812533 A, US5761659 A, US5706515 A, US5673394 A, US5560003 A, US5502840 A, US4914586 A, US4747130 A,

Forward Citations: WO16164155, WO06024957, WO06024957, WO05045584, WO05045584, US9823945, US9811319, US9674287, US9654515, US9565297, US9563971, US9509790, US9503407, US9479404, US9465734, US9417905, US9329911, US9323543, US9269060, US9245236, US9170864, US9158594, US9038082, US9015443, US8966498, US8914493, US8881164, US8881162, US8879547, US8843880, US8826269, US8819389, US8776084, US8744055, US8675852, US8589338, US8583830, US8578132, US8539166, US8539097, US8533773, US8527734, US8505067, US8458703, US8458368, US8424018, US8401022, US8370506, US8321594, US8321498, US8230449, US8214503, US8161171, US8140679, US8090848, US8073810, US7808506, US7788299, US7705851, US7619633, US7558864, US7548237, US7511718, US7493391, US7486294, US7477259, US7467384, US7466315, US7461054, US7443401, US7417645, US7386557, US7308690, US7265756, US7126606, US7107597, US7107597, US7088374, US7069558, US6952826, US6801914, US6738889, US6704806, US6658433, US6546450, US6496864, US6449615, US2017277466, US2015026335, US2014298051, US2014196059, US2014189697, US2013305259, US2011239003, US2011191785, US2011029971, US2010318997, US2010306416, US2010191213, US2010191923, US2010191917, US2010191909, US2010191823, US2010049826, US2009328051, US2009132717, US2009113050, US2009112875, US2008288966, US2008235380, US2008235327, US2007198723, US2007057943, US2007035543, US2006244754, US2006112138, US2006026141, US2006015872, US2005267958, US2005187922, US2005163143, US2005140694, US2005021514, US2004255299, US2004194020, US2004189669, US2004189667, US2004189645, US2004130550, US2002112054, US2002111949, US10359922, US10223163, US10102047, US10102046, KR20170132296, KR101971389, EP2478667, CN106662993, CN106662993,

Abstract:

The present invention relates to systems and methods for freeing shared resources that remain allocated to a particular resource allocating process after the resource allocating process has terminated. The invention is useful in a computer system where shared hardware is accessed via a shared hardware driver layer. The shared hardware driver layer interfaces with either a shared API layer or a nonshared API layer. Processes wishing to access the shared hardware access the hardware through either the shared or nonshared API layer. To release resources and destroy objects in either the shared API layer or the shared hardware driver layer, the present invention uses a helper process that cleans up after termination of the resource allocation process. The helper process first calls, cleanup function in the shared API layer to release resources and destroy objects in the shared API layer and associated hardware driver. The helper process then loads a copy of the nonshared API layer and makes a call to a

similar cleanup function to release any remaining resources and destroy any remaining objects. In the alternative, the helper process loads a copy of the nonshared API layer and calls to the similar cleanup function are made by the cleanup function in the shared API layer.



4) Family number: 29173361 (US2003191783A)

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Title:	FAST LIFETIME ANALYSIS OF OBJECTS IN A GARBAGE-COLLECTED SYSTEM			
Priority:	US20020116236 20020403		US20040796539 20040308	
Family:	Publication number	Publication date	Application number	Application date
	US2003191783 AA	20031009	US20020116236	20020403
	US6728738 BB	20040427	US20020116236	20020403
	US7376683 BA	20080520	US20040796539	20040308

Probable Assignee: ORACLE CORP
Assignee(s):(std): SUN MICROSYSTEMS INC
Assignee(s): SUN MICROSYSTEMS INC A DELAWARE CORP ; ORACLE AMERICA INC ; ORACLE CORP
Inventor(s):(std): WOLCZKO MARIO ; CUNEI ANTONIO
Agent(s): GUNNISON MCKAY AND HODGSON LLP; MCKAY PHILIP J; PHILIP J
International class (IPC 8-9): G06F12/00 G06F12/02 G06F17/30 (Advanced/Invention); G06F12/00 G06F12/02 G06F17/30 (Core/Invention)
International class (IPC 1-7): G06F17/30
CPC: Y10S707/99957 G06F12/0261
European class: G06F12/02D2G2
US class: 1/1 707/200 707/206 707/999.2 707/999.206 711/E12.01

[Classification Explorer](#)

Cited documents: US7174354 BB, US6523059 BA, US6446257 BA, US6094664 A, US5968136 A, US5446901 A, US5241673 A, US4775932 A, US2003105777 AA, US2003084266 AA, US2002178437 AA, US2002073103 AA, US2001044856 AA,

Forward Citations: WO13036701, WO13036701, WO11116087, USD854229, USD851804, USD848665, USD848664, USD848663, USD843640, USD843049, USD842532, USD839471, USD837442, USD826469, USD826468, USD826467, USD825828, USD825827, USD825826, USD822882, USD814687, USD811647, USD804710, USD804709, USD804708, USD804707, USD804706, USD804079, USD804078, USD802830, USD802829, USD802828, USD802826, USD797353, USD797350, USD796728, USD796727, USD792635, USD786488, USD783887, USD781492, USD775760, USD775406, USD773107, USD771301, USD770670, USD770079, USD769514, USD769513, US9983978, US9959194, US9959043, US9940369, US9940234, US9934127, US9934126, US9910800, US9910618, US9903578, US9892071, US9888633, US9886314, US9882913, US9880743, US9851762, US9841921, US9817603, US9811264, US9804779, US9785549, US9760479, US9760297, US9752766, US9750199, US9740414, US9716755, US9674637, US9613073, US9575879, US9521200, US9507532, US9335038, US9176871, US9053017, US9052824, US8948795, US8914324, US8868624, US8825721, US8589653, US8554744, US8504596, US8504594, US8478797, US8397044, US8260793, US8126980, US8056055, US7882159, US7757202, US7725545, US7707232, US7565386, US7424499, US7293263, US2016283372, US2015269196, US2013311521, US2013086132, US2013066927, US2012324479, US2012239685, US2011213943, US2011196845, US2011087713, US2011035405, US2010229237, US2010049938, US2009030959, US2009030958, US2008270482, US2008065842, US2007226281, US2006259528, US2006167960, US2005198270, US2005081190, US2004133895, US10489307, US10484174, US10474363, US10473317, US10467107, US10459664, US10459652, US10454810, US10452444, US10432233, US10417092, US10416924, US10374868, US10372601, US10365982, US10360214, US10353777, US10353743, US10346043, US10331588, US10331370, US10326836, US10318196, US10310753, US10303390, US10296258, US10296236, US10289347, US10289344, US10284232, US10282274, US10275397, US10275285, US10275176, US10268403, US10255176, US10235273, US10235229, US10223163, US10198205, US10198194, US10185645, US10162835, US10162566, US10146585, US10082971, US10078469, US10037269, US10031843, US10027757, US10021170, US10007459, US10001951, KR20140059801, KR101983413, JP6087928, JP2014529142, EP2754054, EP2754054, EP2754054, EP2548122, CN102999328, CN102999328,

Abstract:

PatBase - US2003191783_AA

Patent Application Publication Oct. 9, 2003 Sheet 1 of 8 US 2003/0191783 A1

FIG. 1

Family:	Publication number	Publication date	Application number	Application date
	CA2576403 AA	20070826	CA20072576403	20070123
	CN101046755 A	20071003	CN200610034590	20060328
	CN101046755 B	20110615	CN200610034590	20060328
	US2007203960 AA	20070830	US20070625346	20070122
	US7584232 BB	20090901	US20070625346	20070122

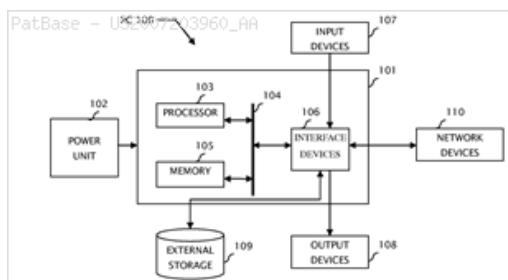
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Forward Citations: WO18076796, WO18072408, WO14033606, WO14033606, WO12134728, WO12134728, USRE42396, US9985829, US9934242, US9891899, US9846553, US9830324, US9830306, US9830305, US9785549, US9774582, US9772941, US9767019, US9747088, US9740608, US9740460, US9715521, US9684685, US9658880, US9628438, US9626291, US9613073, US9582479, US9563550, US9552382, US9514137, US9430452, US9430164, US9430153, US9405738, US9342274, US9317218, US9244896, US9229959, US9116867, US9098269, US9092253, US9053017, US9009203, US8959321, US8943109, US8930420, US8918759, US8887142, US8881101, US8825719, US8825667, US8812796, US8769230, US8688951, US8539468, US8539465, US8533440, US8527560, US8504596, US8489864, US8402218, US8370577, US8356166, US8346821, US8316064, US8250331, US8229907, US8181177, US8103706, US8082399, US8032568, US8006047, US7987215, US7882159, US7860906, US7831640, US7801872, US2015269196, US2015186266, US2014317609, US2014317065, US2014237004, US2014068158, US2013066927, US2012254265, US2012166892, US2011321005, US2011276984, US2011225213, US2011145553, US2011145498, US2011145304, US2011087713, US2010332808, US2010332807, US2010332771, US2010332768, US2010332721, US2010332538, US2010153675, US2010114998, US2010049735, US2010030968, US2009327373, US2009300085, US2009265402, US2009259702, US2009254596, US2009210865, US2009094301, US2009094300, US2009030959, US2009030958, US2009006787, US2009006507, US2008301290, US2008270482, US2007299864, US10474654, US10452532, US10437720, US10372337, US10353751, US10282238, US10275289, US10248556, US10248415, US10223163, US10146685, US10042752, US10013290, KR20140059801, KR101983413, CN107967205, CN106293939, CN106293939, CN106293941, CN106293941, CN105260174

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Abstract:

The present invention is a method and system of automatic memory management (garbage collection). An application automatically marks up objects referenced from the "extended root set". At garbage collection, the system starts traversal from the marked-up objects. It can conduct accurate garbage collection in a non-GC language, such as C++. It provides a deterministic reclamation feature. An object and its resources are released immediately when the last reference is dropped. Application codes automatically become entirely GC-safe and interruptible. A concurrent collector can be pause-less and with predictable worst-case latency of micro-second level. Memory usage is efficient and the cost of reference counting is significantly reduced.



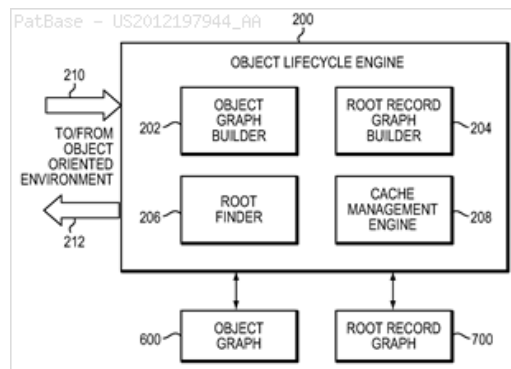
6) Family number: 51636691 (US2012197944A)

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Title:	SYSTEM AND METHOD FOR DETERMINING AN OBJECT'S LIFETIME IN AN OBJECT ORIENTED ENVIRONMENT																												
Priority:	US20110438019P 20110131		US20110077338 20110331		WO2011US00576 20110331																								
Family:	<table><tr><th>Publication number</th><th>Publication date</th><th>Application number</th><th>Application date</th></tr><tr><td>EP2671161 A1</td><td>20131211</td><td>EP20110717052</td><td>20110331</td></tr><tr><td>EP2671161 B1</td><td>20190313</td><td>EP20110717052</td><td>20110331</td></tr><tr><td>US2012197944 AA</td><td>20120802</td><td>US20110077338</td><td>20110331</td></tr><tr><td>US9600411 BB</td><td>20170321</td><td>US20110077338</td><td>20110331</td></tr><tr><td>WO12105927 A1</td><td>20120809</td><td>WO2011US00576</td><td>20110331</td></tr></table>					Publication number	Publication date	Application number	Application date	EP2671161 A1	20131211	EP20110717052	20110331	EP2671161 B1	20190313	EP20110717052	20110331	US2012197944 AA	20120802	US20110077338	20110331	US9600411 BB	20170321	US20110077338	20110331	WO12105927 A1	20120809	WO2011US00576	20110331
Publication number	Publication date	Application number	Application date																										
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Probable Assignee:	MATHWORKS INC																												
Assignee(s):(std):	FOTI DAVID A ; MATHWORKS INC																												
Assignee(s):	THE MATHWORKS INC																												
Inventor(s):(std):	FOTI DAVID A																												
Agent(s):	RUPPRECHT KAY; MICHAEL R; CESARI AND MCKENNA LLP; REINEMANN MICHAEL R ET AL																												
Designated states:	AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PE PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW																												
International class (IPC 8-9):	G06F12/02 G06F17/30 G06F7/00 (Advanced/Invention)																												
CPC:	G06F12/0253																												
European class:	G06F12/02D2G																												
US class:	707/798 707/798P 707/E17.011 707/E17.011S																												
Classification Explorer																													
Cited documents:	US8238269 BB, US7958790 BB, US7849470 BB, US7725904 BB, US7584452 BA, US7237237 BB, US7237237, US7181745 BA, US7051338 BA, US7051333 BA, US6976087 BA, US6874074 BA, US6795836 BB, US6502110 BA, US6381738 BA, US6363403 BA, US61438019, US5392432 A, US5241673 A, US5241673 A, US2011066638 AA, US2010223631 AA, US2009271460 AA, US2009271460 AA, US2009183139 AA, US2009150430 AA, US2009077536 AA, US2009077121 AA, US2008312984 AA, US2008162549 AA, US2008127064 AA, US2008127064 AA, US2008114804 AA, US2007288892 AA, US2007226688 AA, US2004181782 AA, US2004181782 AA, US2004181562 AA, EP1489518 A1, EP1489518 A1,																												
Forward Citations:	US9684685, US9674637, US9626291, US9311111, US9208590, US9208191, US9009203, US8682933, US2015302327, US2015302324, US2015213113, US2014025651, US2012324479, US2012293542, US2012293541, US2009077536, US10324837, US10275289, US10223163, US10133997, US10133996, US10078584, US10019245,																												

Abstract:

A system and method determines an object's lifetime. An object lifecycle engine may work with an object oriented environment. As objects are created, an object graph may be constructed having one or more roots. A root record graph may be constructed, and edges of the root record graph may point in an opposite direction than the edges of the object graph. As objects, entities, and references are added, removed, or deleted from within the environment, the object graph and the root record graph may be updated. A root finder may search the root record graph to determine whether a given root record is no longer rooted. If a root record is no longer rooted, then the object associated with that root record may be determined to be unreachable and at the end of its lifetime. If the root finder search is performed when references are removed, then objects may be destroyed in a deterministic manner.



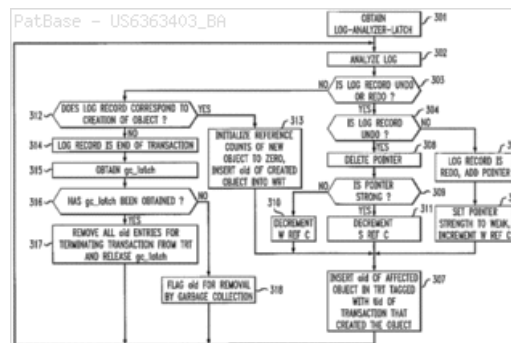
7) Family number: 20400692 (US6363403B)

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Title:	GARBAGE COLLECTION IN OBJECT ORIENTED DATABASES USING TRANSACTIONAL CYCLIC REFERENCE COUNTING			
Priority:	US19990345826 19990630			
Family:	Publication number	Publication date	Application number	Application date
	US6363403 BA	20020326	US19990345826	19990630
Probable Assignee:	WSOU INVESTMENTS LLC			
Assignee(s):(std):	LUCENT TECHNOLOGIES INC			
Assignee(s):	OMEGA CREDIT OPPORTUNITIES MASTER FUND LP ; WSOU INVESTMENTS LLC ; BP FUNDING TRUST SERIES SPL VI			
Inventor(s):(std):	ROY PRASAN ; SESHADRI SRINIVASAN ; SILBERSCHATZ ABRAHAM ; SUDARSHAN SUNDARARAJARAO			
International class (IPC 8-9):	G06F12/02 G06F17/30 (Advanced/Invention); G06F12/02 G06F17/30 (Core/Invention)			
International class (IPC 1-7):	G06F17/30			
CPC:	Y10S707/99944 Y10S707/99957 G06F12/0261 G06F16/2343 G06F16/2358			
European class:	G06F12/02D2G2 G06F17/30S			
US class:	1/1 707/103Y 707/206 707/999.103 707/999.206 707/E17.005 711/E12.01			
Classification Explorer				
Cited documents:	US6199075 BA, US5900001 A, US5848423 A, US5560003 A, US5485613 A, US5398334 A, US5321834 A, US5241673 A, US4775932 A,			
Forward Citations:	US9804963, US9613073, US9600411, US9489406, US9384037, US9317265, US9053017, US8930420, US8838656, US8782104, US8527558, US8346821, US8127222, US8126940, US8103706, US8056055, US7882505, US7849110, US7650350, US7599973, US7565499, US7412580, US7313566, US7272695, US7237237, US7225439, US7216136, US7092978, US7072918, US7058670, US7039664, US6976022, US6965905, US6769118, US6721865, US2014317352, US2014289716, US2012197944, US2012166892, US2012131070, US2011276984, US2009100531, US2009094301, US2009094300, US2009006507, US2008235309, US2008162610, US2008034022, US2007220027, US2007185943, US2007174370, US2006218557, US2004193662, US2004187102, US2004187098, US2004167947, US2004122875, US2004122874, US2004111446, US2004111445, US2004054643, US2003023768, US2002087590, US10437720, US10223163, EP2754054, EP2754054,			

Abstract:

A reference counting a garbage collection process employs a reference counting technique in which only the "last" detected strong pointer is followed to an object. Moreover, no assumptions are made about the phase locking used in the transaction and strict WAL is not followed. Indeed, a relatively restricted local traversal of the object graph is employed which leads to higher efficiency. Furthermore, in a client-server arrangement, updates made by a transaction running at the client may be reflected at the server after the transaction ends, and the updates are not required to be forced to the server before the end of the transaction.



8) Family number: 11793693 (US6473773B)

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Title:	MEMORY MANAGEMENT IN A PARTIALLY GARBAGE-COLLECTED PROGRAMMING SYSTEM			
Priority:	CA19972204972 19970509 CA19972225932 19971224			
Family:	Publication number	Publication date	Application number	Application date

CA2204972 AA	19981109	CA19972204972	19970509
CA2225932 AA	19981109	CA19972225932	19971224
US6473773 BA	20021029	US19980092737	19980606

Probable Assignee: IBM

Assignee(s):(std): IBM CANADA ; IBM

Assignee(s): IBM CANADA IBM CANADA LIMITEE LTD ; INT BUSINESS MACHINES CORP ; NASH SIMON CHRISTOPHER ; THOMSON BRIAN WARD ; ROCHAT KIM LAWSON ; CHENG MICHAEL ; HANSON TIM SCOTT

Inventor(s):(std): CHENG MICHAEL ; ROCHAT KIM LAWSON ; NASH SIMON CHRISTOPHER ; HANSON TIM SCOTT ; THOMSON BRIAN WARD

Agent(s): SAUNDERS RAYMOND H

International class (IPC 8-9): G06F12/02 G06F9/44 G06F9/46 (Advanced/Invention); G06F12/02 G06F9/44 (Core/Invention)

International class (IPC 1-7): G06F17/00 G06F9/44 G06F9/46

CPC: Y10S707/955 Y10S707/99944 G06F12/0253 G06F9/4488 G06F12/0261

European class: G06F12/02D2G G06F12/02D2G2 G06F9/44F2

US class: 707/103R 707/103Z 707/200 707/814 707/955 707/999.103 707/999.2 711/E12.01 717/116

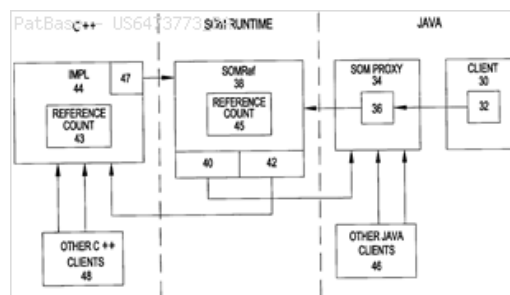
[Classification Explorer](#)

Cited documents: US6029175 A,

Forward Citations: WO18013377, WO07037710, USRE42396, US9891899, US9811353, US9804963, US9785549, US9747088, US9460547, US9390006, US9383979, US9274948, US9152400, US8990789, US8838656, US8782104, US8539468, US8482561, US8417744, US8326895, US8260818, US8255887, US8255435, US8103706, US8028299, US7921143, US7894229, US7890711, US7882158, US7805467, US7774389, US7769791, US7730465, US7680935, US7533123, US7454447, US7433862, US7403961, US7216136, US7194569, US6915520, US6898611, US6865579, US6820101, US6785698, US6757890, US6654773, US2017168932, US2015154010, US2014317607, US2014309970, US2014040327, US2014040326, US2011320970, US2010241675, US2010229156, US2010073369, US2009222802, US2009222801, US2009210865, US2009147557, US2009094301, US2009094300, US2008270482, US2008263295, US2008172431, US2008126736, US2008086603, US2007185943, US2007156729, US2006218561, US2006101032, US2006095890, US2006095483, US2006080364, US2006070031, US2006037026, US2004268367, US2004187098, US2004117793, US2004015849, US2002165994, US2002120640, US2002087590, US10437720, US10353751, US10282238, US10248415, US10223163, US10210081, JP5452474, JP2010525490, EP2153317, EP2153317, EP1653344,

Abstract:

Memory management to support calls between objects in language environments support automatic garbage collection and language environments requiring explicit control of object destruction is provided. Reference counting is used to automatically control the lifetime of objects requiring explicit destruction and that are to be accessible across the language boundary. A data structure is maintained in a runtime component for each object that is accessed over a language boundary. The reference count for each non-garbage collected object is incremented by the runtime in accordance with the number of cross-language references held to it. When the count reaches zero through decrements as the references are returned and destroyed, the non-garbage collected object can be safely and automatically destroyed. The runtime creates a strong reference to any garbage collected object accessed by a cross-language call. The reference is visible to the garbage collector, and prevents the object being collected while the reference is in existence.



9) Family number: 30239806 (US6681263B)

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Title: CONTROL OF SOFTWARE OBJECT LIFETIME

Priority: US19980052646 19980331

Family:

Publication number	Publication date	Application number	Application date
US6681263 BA	20040120	US19980052646	19980331

Probable Assignee: INTEL CORP

Assignee(s):(std): INTEL CORP

Inventor(s):(std): KING DAVID A

International class (IPC 8-9): G06F9/44 (Advanced/Invention); G06F9/44 (Core/Invention)

International class (IPC 1-7): G06F9/44

CPC: Y10S707/99953 Y10S707/99957 G06F9/4493

European class: G06F9/44F2C

US class: 707/206 707/999.202 707/999.206 709/315 719/315

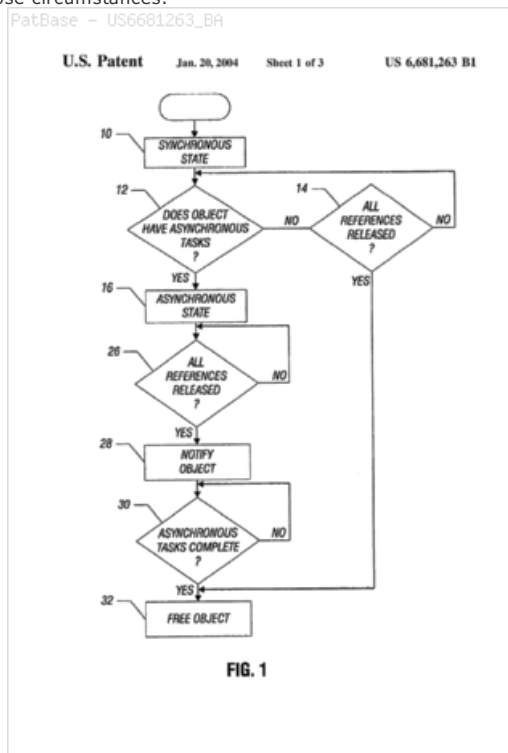
[Classification Explorer](#)

Cited documents: US5931919 A, US5136712 A, US4912629 A,

Forward Citations: US9940234, US9891899, US9785549, US9674637, US9400692, US8434099, US8239865, US8032886, US7171674, US7155728, US7143421, US2017322785, US2016283372, US2016092273, US2012324479, US2009300630, US2008270482, US2006059496, US2004015877, US2003033441, US10223163,

Abstract:

A software object's lifetime may be controlled to allow it to complete certain tasks asynchronously after all references to the object have been released. The object may be created in a first state and transitioned to a second state under certain circumstances. For example, if it is known that the object needs to complete certain tasks asynchronously after all references to the object have been released, the object may be transitioned to the second state. If the object is created in a technology which uses reference counting, the reference count may be artificially incremented upon state transition. After the object transitions from the first state to the second state, and all references to the object have been released, the object is so notified and if appropriate, the object can undertake certain tasks appropriate under those circumstances.

**10) Family number: 13178848** (US2003033320A)

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Title: MEMORY RECLAMATION METHOD

Priority: GB19990006629 19990323 WO2000EP01973 20000307 US20000533485 20000323
KR20007013199 20001123 WO2000EP01973 20001123 US20020264904 20021004

Family:

Publication number	Publication date	Application number	Application date
DE60032685 D1	20070215	DE20006032685	20000307
DE60032685 D1	20070215	DE20006032685T	20000307
DE60032685 T2	20071115	DE20006032685T	20000307
EP1080411 A1	20010307	EP20000912559	20000307
EP1080411 B1	20070103	EP20000912559	20000307
GB9906629 A0	19990519	GB19990006629	19990323
JP2002540503 T2	20021126	JP20000607085T	20000307
KR100732869 B1	20070628	KR20007013199	20000307
KR20010043785 A	20010525	KR20007013199	20000307
US2003033320 AA	20030213	US20020264904	20021004
US6487563 BA	20021126	US20000533485	20000323
US7308466 BB	20071211	US20020264904	20021004
WO0057277 A1	20000928	WO2000EP01973	20000307

Probable Assignee: UNILOC 2017 LLC**Assignee(s):**(std): KONINKL PHILIPS ELECTRONICS NV ; PHILIPS KONINKLL NV**Assignee(s):** UNILOC 2017 LLC ; IPG ELECTRONICS 503 LTD ; KONINKLIJKE PHILIPS ELECTRONICS N V ; PENDRAGON WIRELESS LLC ; PHILIPS ELECTRONICS KONINKLL NV ; US PHILIPS CORP**Inventor(s):**(std): HOULDSWORTH RICHARD J ; HOULDSWORTH J**Designated states:** AT BE CH CY DE DK ES FI FR GB GR IE IT JP KR LU MC NL PT SE

International class
(IPC 8-9): G06F12/00 G06F12/02 G06F17/30 (Advanced/Invention);
G06F12/02 (Advanced/Non-invention);
G06F12/02 (Core/Invention)

International class
(IPC 1-7): G06F12/00 G06F12/02 G06F17/30 G06F7/00

CPC: Y10S707/99957 G06F12/0269**European class:** G06F12/02D2G4

US class: 1/1 1/1P 707/103 707/103R 707/200 707/206 707/999.103 707/999.103S 707/999.206
711/E12.011 711/E12.011S

[Classification Explorer](#)

Cited documents: WO9919802 A2, US6317756 BA, US6308185 BA, US6098089 A, US5903899 A, US5857207 A, US5848423 A, US5535390 A, US5485613 A,

Forward Citations: WO18013377, USRE42396, US9933945, US9891899, US9747088, US9747086, US9665474, US9613073, US9575813, US9430492, US9417935, US9047196, US9043788, US8793669, US8726255, US8707326,

US8700838, US8656135, US8656134, US8650538, US8607018, US8595743, US8504596, US8224875, US8224874, US7987315, US7913003, US7882159, US7827366, US7398531, US7340493, US7076511, US6906823, US6725444, US6654773, US2017154037, US2016292071, US2014304478, US2011167096, US2011087713, US2009030959, US2009030958, US2007204126, US2007186065, US2006074990, US2005177836, US2002120640, US10423581, US10223163, US10114844, US10013217, JP2014529142, JP2005529384,

Abstract:

A method of reclaiming memory space allocated to a data structure comprising data objects (910-960) linked by identifying pointers, in which the memory allocated to data objects is reclaimed using two systems: a first system (980), by which a selected part of the data structure is traversed by following the pointers, one of at least two identifiers being allocated to the data objects, a first identifier which indicates that the data object has been traversed so that the data objects referenced by the pointers of that data object have been identified, and a second identifier which indicates that the data object is referenced by a pointer, but the data object has not yet been traversed; and a second system (990), by which an individual data object is selected for deletion to enable the associated memory space to be reclaimed. The second system (990) reads the first system identifier for the individual data object, and if the first identifier is present deletes the data object thereby reclaiming the associated memory space. If the second identifier is present, it allocates a third identifier, where the first system (980) operates to reclaim the memory space allocated to data objects having the third identifier.

