

Exhibit 2



US009703750B2

(12) **United States Patent**
Chu

(10) **Patent No.:** **US 9,703,750 B2**

(45) **Date of Patent:** ***Jul. 11, 2017**

(54) **COMPUTER SYSTEM INCLUDING CPU OR PERIPHERAL BRIDGE DIRECTLY CONNECTED TO A LOW VOLTAGE DIFFERENTIAL SIGNAL CHANNEL THAT COMMUNICATES SERIAL BITS OF A PERIPHERAL COMPONENT INTERCONNECT BUS TRANSACTION IN OPPOSITE DIRECTIONS**

(58) **Field of Classification Search**
USPC 710/300-317, 62-64, 72-74;
709/214-219, 226-227; 714/43-44, 11,
(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

(71) Applicant: **Acqis LLC**, McKinney, TX (US)

3,996,585 A 12/1976 Hogan et al.

4,141,068 A 2/1979 Mager et al.

(Continued)

(72) Inventor: **William W. Y. Chu**, Los Altos, CA (US)

FOREIGN PATENT DOCUMENTS

(73) Assignee: **Acqis LLC**, McKinney, TX (US)

EP 0722138 A1 7/1996

JP 6-289953 10/1994

(Continued)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 275 days.

This patent is subject to a terminal disclaimer.

OTHER PUBLICATIONS

Boosten, "Transmission Overhead and Optimal Packet Size", Mar. 11, 1998, printed on: Jan. 28, 2011, 2 pgs.

(Continued)

(21) Appl. No.: **14/511,093**

(22) Filed: **Oct. 9, 2014**

Primary Examiner — Raymond Phan

(74) Attorney, Agent, or Firm — Cooley LLP

(65) **Prior Publication Data**

US 2015/0026373 A1 Jan. 22, 2015

Related U.S. Application Data

(63) Continuation of application No. 14/209,922, filed on Mar. 13, 2014, now Pat. No. 9,529,768, which is a (Continued)

(57) **ABSTRACT**

A computer system for multi-processing purposes. The computer system has a console comprising a first coupling site and a second coupling site. Each coupling site comprises a connector. The console is an enclosure that is capable of housing each coupling site. The system also has a plurality of computer modules, where each of the computer modules is coupled to a connector. Each of the computer modules has a processing unit, a main memory coupled to the processing unit, a graphics controller coupled to the processing unit, and a mass storage device coupled to the processing unit. Each of the computer modules is substantially similar in design to each other to provide independent processing of each of the computer modules in the computer system.

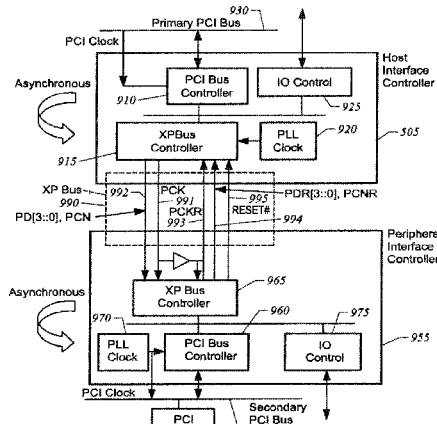
(51) **Int. Cl.**
G06F 13/20 (2006.01)
G06F 13/42 (2006.01)

(Continued)

(52) **U.S. Cl.**
CPC **G06F 13/4282** (2013.01); **G06F 1/08** (2013.01); **G06F 1/12** (2013.01); **G06F 1/1632** (2013.01);

(Continued)

51 Claims, 35 Drawing Sheets



US 9,703,750 B2

Page 2

Related U.S. Application Data

- continuation of application No. 13/744,287, filed on Jan. 17, 2013, now Pat. No. 8,756,359, which is a continuation of application No. 13/649,084, filed on Oct. 10, 2012, now Pat. No. 8,977,797, which is a continuation of application No. 13/560,924, filed on Jul. 27, 2012, now Pat. No. 8,626,977, which is a continuation of application No. 13/087,912, filed on Apr. 15, 2011, now Pat. No. 8,234,436, which is a continuation of application No. 12/504,534, filed on Jul. 16, 2009, now Pat. No. 8,041,873, which is a continuation of application No. 12/077,503, filed on Mar. 18, 2008, now Pat. No. 7,676,624, which is a continuation of application No. 11/166,656, filed on Jun. 24, 2005, now Pat. No. 7,376,779, which is a continuation of application No. 11/097,694, filed on Mar. 31, 2005, now Pat. No. 7,363,415, which is a continuation of application No. 10/772,214, filed on Feb. 3, 2004, now Pat. No. 7,099,981, which is a continuation of application No. 09/569,758, filed on May 12, 2000, now Pat. No. 6,718,415.
- (60) Provisional application No. 60/134,122, filed on May 14, 1999.
- (51) **Int. Cl.**
G06F 13/40 (2006.01)
G06F 1/16 (2006.01)
G06F 1/12 (2006.01)
G06F 13/38 (2006.01)
G06F 1/08 (2006.01)
G06F 13/10 (2006.01)
- (52) **U.S. Cl.**
CPC **G06F 13/102** (2013.01); **G06F 13/20** (2013.01); **G06F 13/385** (2013.01); **G06F 13/409** (2013.01); **G06F 13/4027** (2013.01); **G06F 13/4068** (2013.01); **G06F 13/42** (2013.01); **G06F 13/4221** (2013.01); **Y02B 60/1228** (2013.01); **Y02B 60/1235** (2013.01)
- (58) **Field of Classification Search**
USPC 714/13
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,228,496 A	10/1980	Katzman et al.	5,251,097 A	10/1993	Simmons et al.
4,453,215 A	6/1984	Reid	5,278,509 A	1/1994	Haynes et al.
4,570,220 A	2/1986	Tetrick et al.	5,278,730 A	1/1994	Kikinis
4,615,039 A	9/1986	Li	5,282,247 A	1/1994	McLean et al.
4,623,964 A	11/1986	Getz et al.	5,293,497 A	3/1994	Free
4,670,837 A	6/1987	Sheets	5,311,397 A	5/1994	Harshberger et al.
4,680,674 A	7/1987	Moore	5,317,441 A	5/1994	Sidman
4,700,362 A	10/1987	Todd et al.	5,317,477 A	5/1994	Gillett
4,760,276 A	7/1988	Lethellier	5,319,771 A	6/1994	Takeda
4,769,764 A	9/1988	Levanon	5,325,517 A	6/1994	Baker et al.
4,791,524 A	12/1988	Teigen et al.	5,331,509 A	7/1994	Kikinis
4,799,258 A	1/1989	Davies	5,339,408 A	8/1994	Bruckert et al.
4,872,091 A	10/1989	Maniwa et al.	5,355,391 A	10/1994	Horowitz et al.
4,890,282 A	12/1989	Lambert et al.	5,428,806 A	6/1995	Pocrass
4,918,572 A	4/1990	Tarver et al.	5,430,607 A	7/1995	Smith
4,939,735 A	7/1990	Fredericks et al.	5,432,939 A	7/1995	Blackledge, Jr. et al.
5,056,141 A	10/1991	Dyke	5,436,857 A	7/1995	Nelson et al.
5,086,499 A	2/1992	Mutone	5,436,902 A	7/1995	McNamara et al.
5,103,446 A	4/1992	Fischer	5,463,742 A	10/1995	Kobayashi
5,187,645 A	2/1993	Spalding et al.	5,485,488 A	1/1996	Van Brunt et al.
5,191,581 A	3/1993	Woodbury et al.	5,519,843 A	5/1996	Moran et al.
			5,533,125 A	7/1996	Bensimon et al.
			5,537,544 A	7/1996	Morisawa et al.
			5,539,616 A	7/1996	Kikinis
			5,546,463 A	8/1996	Caputo et al.
			5,550,710 A	8/1996	Rahamim et al.
			5,550,861 A	8/1996	Chan et al.
			5,552,776 A	9/1996	Wade et al.
			5,572,441 A	11/1996	Boie
			5,577,205 A	11/1996	Hwang et al.
			5,578,940 A	11/1996	Dillon et al.
			5,588,850 A	12/1996	Pan et al.
			5,590,377 A	12/1996	Smith
			5,600,800 A	2/1997	Kikinis et al.
			5,603,044 A	2/1997	Annapareddy et al.
			5,606,717 A	2/1997	Farmwald et al.
			5,608,608 A	3/1997	Flint et al.
			5,623,637 A	4/1997	Jones et al.
			5,630,057 A	5/1997	Hait
			5,638,521 A	6/1997	Buchala et al.
			5,640,302 A	6/1997	Kikinis
			5,648,762 A	7/1997	Ichimura et al.
			5,659,773 A	8/1997	Huynh et al.
			5,663,661 A	9/1997	Dillon et al.
			5,673,172 A	9/1997	Hastings et al.
			5,673,174 A	9/1997	Hamirani
			5,680,126 A	10/1997	Kikinis
			5,680,536 A	10/1997	Tyuluman
			5,689,654 A	11/1997	Kikinis et al.
			5,708,840 A	1/1998	Kikinis et al.
			5,721,837 A	2/1998	Kikinis et al.
			5,721,842 A	2/1998	Beasley et al.
			5,724,591 A	3/1998	Hara et al.
			5,737,194 A	4/1998	Hopkins et al.
			5,737,524 A	4/1998	Cohen et al.
			5,742,840 A	4/1998	Hansen et al.
			5,745,733 A	4/1998	Robinson
			5,751,711 A	5/1998	Sakaue
			5,751,950 A	5/1998	Crisan
			5,752,080 A	5/1998	Ryan
			5,764,924 A	6/1998	Hong
			5,774,703 A	6/1998	Weiss et al.
			5,774,704 A	6/1998	Williams
			5,787,259 A	7/1998	Haroun et al.
			5,795,228 A	8/1998	Trumbull et al.
			5,802,391 A	9/1998	Hwang
			5,805,903 A	9/1998	Elkhoury
			5,809,262 A	9/1998	Potter
			5,809,538 A	9/1998	Pollmann et al.
			5,815,681 A	9/1998	Kikinis
			5,819,050 A	10/1998	Boehling et al.
			5,819,053 A	10/1998	Goodrum et al.
			5,822,571 A	10/1998	Goodrum et al.
			5,826,048 A	10/1998	Dempsey et al.
			5,838,932 A	11/1998	Alzien
			5,848,249 A	12/1998	Garbus et al.
			5,857,085 A	1/1999	Zhang et al.

US 9,703,750 B2

Page 3

(56)	References Cited	6,303,875 B1 *	10/2001	Hata	H01L 23/49838 174/260
	U.S. PATENT DOCUMENTS	6,304,895 B1	10/2001	Schneider et al.	
		6,311,268 B1	10/2001	Chu	
		6,311,287 B1	10/2001	Dischler et al.	
		6,314,522 B1	11/2001	Chu	
		6,317,329 B1	11/2001	Dowdy et al.	
		6,321,277 B1	11/2001	Andresen et al.	
		6,321,335 B1	11/2001	Chu	
		6,324,605 B1	11/2001	Rafferty et al.	
		6,325,636 B1	12/2001	Hipp et al.	
		6,332,180 B1	12/2001	Kauffman et al.	
		6,345,330 B2	2/2002	Chu	
		6,356,968 B1	3/2002	Kishon	
		6,366,951 B1	4/2002	Schmidt	
		6,378,009 B1	4/2002	Pinkston, II et al.	
		6,381,602 B1	4/2002	Shoroff et al.	
		6,393,561 B1	5/2002	Hagiwara et al.	
		6,401,124 B1	6/2002	Yang et al.	
		6,411,506 B1	6/2002	Hipp et al.	
		6,425,033 B1	7/2002	Conway et al.	
		6,430,000 B1	8/2002	Rent	
		6,452,789 B1	9/2002	Pallotti et al.	
		6,452,790 B1	9/2002	Chu	
		6,453,344 B1	9/2002	Ellsworth et al.	
		6,460,106 B1	10/2002	Stufflebeam	
		6,477,593 B1	11/2002	Khosrowpour et al.	
		6,487,614 B2	11/2002	Nobutani et al.	
		6,496,361 B2	12/2002	Kim et al.	
		6,498,361 B1	12/2002	Osann, Jr.	
		6,549,966 B1	4/2003	Dickens et al.	
		6,564,274 B1	5/2003	Heath et al.	
		6,567,877 B1	5/2003	Hassan et al.	
		6,570,561 B1	5/2003	Boesch et al.	
		6,578,103 B1	6/2003	Hill et al.	
		6,581,125 B1	6/2003	Lange et al.	
		6,643,777 B1	11/2003	Chu	
		6,664,377 B1	12/2003	Xu	
		6,715,100 B1	3/2004	Hwang	
		6,718,415 B1	4/2004	Chu	
		6,725,317 B1	4/2004	Bouchier et al.	
		6,742,068 B2	5/2004	Gallagher et al.	
		6,747,878 B1	6/2004	Hipp et al.	
		6,757,748 B1	6/2004	Hipp	
		6,900,847 B1	5/2005	Agneta et al.	
		6,948,047 B2	9/2005	Maruska et al.	
		6,985,967 B1	1/2006	Hipp	
		7,017,001 B2	3/2006	Hill et al.	
		7,020,735 B2	3/2006	Kikinis	
		7,082,160 B2	7/2006	Chu	
		7,099,981 B2	8/2006	Chu	
		7,123,660 B2	10/2006	Haq et al.	
		7,146,446 B2	12/2006	Chu	
		7,243,173 B2	7/2007	Campbell	
		7,266,661 B2	9/2007	Walmsley	
		7,328,297 B2	2/2008	Chu	
		7,363,415 B2	4/2008	Chu	
		7,363,416 B2	4/2008	Chu	
		7,376,779 B2	5/2008	Chu	
		7,480,303 B1	1/2009	Ngai	
		RE41,076 E	1/2010	Chu	
		RE41,092 E	1/2010	Chu	
		7,676,624 B2	3/2010	Chu	
		RE41,294 E	4/2010	Chu	
		7,783,818 B1	8/2010	Sardella et al.	
		7,818,487 B2	10/2010	Chu	
		7,822,895 B1	10/2010	Sardella et al.	
		RE41,961 E	11/2010	Chu	
		RE42,814 E	10/2011	Chu	
		8,041,873 B2	10/2011	Chu	
		RE42,984 E	11/2011	Chu	
		RE43,119 E	1/2012	Chu	
		8,090,971 B2	1/2012	Sarmento	
		RE43,171 E	2/2012	Chu	
		8,230,145 B2	7/2012	Bresniker	
		8,234,436 B2	7/2012	Chu	

US 9,703,750 B2

Page 4

(56)

References Cited

U.S. PATENT DOCUMENTS

8,626,977	B2 *	1/2014	Chu	G06F 1/12 710/313
8,671,153	B1	3/2014	Chu	
8,739,179	B2	5/2014	Tripathi	
RE44,933	E	6/2014	Chu	
8,756,359	B2	6/2014	Chu	
8,977,797	B2	3/2015	Chu	
9,148,155	B1 *	9/2015	Aggarwal	H03L 7/06
2001/0011312	A1	8/2001	Chu	
2004/0177200	A1	9/2004	Chu	
2004/0268015	A1	12/2004	Petty et al.	
2005/0174729	A1	8/2005	Chu	
2005/0182882	A1	8/2005	Chu	
2005/0195575	A1	9/2005	Chu	
2005/0204083	A1	9/2005	Chu	
2005/0246469	A1	11/2005	Chu	
2006/0265361	A1	11/2006	Chu	
2008/0244149	A1	10/2008	Chu	
2009/0083813	A1	3/2009	Dolce et al.	
2009/0157858	A1	6/2009	Bolan et al.	
2009/0157939	A1	6/2009	Chu	
2009/0164684	A1	6/2009	Atherton et al.	
2009/0268390	A1	10/2009	King et al.	
2009/0292854	A1	11/2009	Khoo	
2010/0082874	A1	4/2010	Baba et al.	
2010/0167557	A1	7/2010	Hoang	
2010/0174844	A1	7/2010	Chu	
2011/0007473	A1	1/2011	Franz et al.	
2011/0145618	A1	6/2011	Andresen et al.	
2011/0208893	A1	8/2011	Chu	
2012/0072633	A1	3/2012	Elboim	
2013/0013957	A1	1/2013	Armstrong et al.	
2013/0024596	A1	1/2013	Chu	
2013/0097352	A1	4/2013	Chu	
2013/0198430	A1	8/2013	Chu	
2013/0346665	A1	12/2013	Freking et al.	
2014/0059266	A1	2/2014	Ben-Michael et al.	
2014/0195713	A1	7/2014	Chu	
2015/0039871	A1	2/2015	Shetty et al.	
2016/0179744	A1	6/2016	Chu	

FOREIGN PATENT DOCUMENTS

JP	6-289956	10/1994
JP	7-64672	3/1995
JP	7-84675	3/1995
WO	WO 92/18924	10/1992
WO	WO 94/00970	1/1994
WO	WO 95/13640	5/1995
WO	WO 97/00481	1/1997
WO	WO 97/05618	2/1997

OTHER PUBLICATIONS

8260 ATM Product Architecture, IBM International Technical Support Organization, Raleigh Center, Sep. 1997, First Edition, International Business Machines Corporation, 220 pages.

8265 Nways ATM Switch, Product Description, Sep. 1998, Fifth Edition, International Business Machines Corporation, 141 pages.

Origin2000 Rackmount Owner's Guide, Document No. 007-3456-003, 1997, Silicon Graphics, Inc., 146 pages.

QuantumNet, Inc., QuantumNet Product Overview [online], 1996 [retrieved on Nov. 16, 2009], Retrieved from the Internet: <URL: <http://web.archive.org/web/19971011194003/www.quantumnet.com/products.htm>>, 1 page.

QuantumNet, Inc., QuantumNet: The Next Generation Computing and Networking Environment [online], 1996 [retrieved on Nov. 16, 2009], Retrieved from the Internet: <URL: <http://web.archive.org/web/19971011194123/www.quantumnet.com/qnetovw.htm>>, 7 pages.

<URL: <http://web.archive.org/web/19971011194317/www.quantumnet.com/ds6500.htm>>, 4 pages.

QuantumNet, Inc., QuantumServer Chassis [online], 1996 [retrieved on Nov. 16, 2009], Retrieved from the Internet: <URL: <http://web.archive.org/web/19971011194309/www.quantumnet.com/dsq6000.htm>>, 3 pages.

Cubix Corporation, White Paper: Benefits of High-Density Servers [online], 1997 [retrieved on Jul. 31, 2009], Retrieved from the Internet: <URL: <http://web.archive.org/web/19970716204215/www.cubix.com/corporate/whitep/densit.htm>>, 6 pages.

Cubix Corporation, Datasheet: Single-Board Computers with Pentium Processors [online], 1997 [retrieved on Jul. 31, 2009], Retrieved from the Internet: <URL: <http://web.archive.org/web/19970716204717/www.cubix.com/corporate/data/bcp5t.htm>>, 5 pages.

Cubix Corporation, Datasheet: ERS/FT II Server Chassis [online], 1997 [retrieved on Jul. 31, 2009], Retrieved from the Internet: <URL: <http://web.archive.org/web/19970716204623/www.cubix.com/corporate/data/ersft2.htm>>, 3 pages.

Cubix Corporation, Cubix ERS/FT II Systems [online], 1997 [retrieved on Jul. 31, 2009], Retrieved from the Internet: <URL: <http://web.archive.org/web/19980124213320/www.cubix.com/support/steps/ers-ft2/intro.htm>>, 5 pages.

Cubix Corporation, Cubix Product Catalog, Summer 1995, 56 pages.

Cubix Corporation, BC Series, Processor Boards Installation Guide, DOC 800A, Aug. 1994, 149 pages.

Cubix Corporation, ERS/FT II—Enhanced Resource Subsystem/Fault Tolerant II, Nov. 1994, 4 pages.

Cubix Corporation, Density Series Plug-In Servers, Plug-In Computers for Managed Server Farms, Sep. 15, 1998, 2 pages.

Cubix Corporation, Cubix Pentium II Plug-In Computers for Density Series Systems, Sep. 15, 1998, 1 page.

Cubix Corporation, Density Series Multi-Server Systems, Sep. 10, 1999, 4 pages.

Compaq Computer Corporation, White Paper, "Order and Configuration Guide for Compaq ProLiant Cluster Series F Model 100," Sep. 1998, pp. 1-8.

Compaq Computer Corporation, QuickSpecs, Compaq ProLiant Cluster Series F Model 100, (undated), pp. 8-36 to 8-37.

Compaq Computer Corporation, Compaq Performance Brief, ProLiant 1600 ServerBench Performance Summary, Aug. 1998, pp. 1-7.

Compaq Computer Corporation, Compaq ActiveAnswers Installation Guide, Installation and Configuration Guide for Linux and Apache Web Server on Compaq Prosignia and ProLiant Servers, May 1999, pp. 1-40.

Compaq Computer Corporation, Compaq White Paper, "Microsoft Internet Information Server 4.0 on the Compaq ProLiant 6500," Aug. 1998, pp. 1-14.

Compaq Computer Corporation, Compaq White Paper, "Accelerating Financial Spreadsheet Simulations with Workstation Clusters," Oct. 1998, pp. 1-14.

Compaq Computer Corporation, ProLiant 6500-PDC/01000 C/S with 4 ProLiant 1850R, TPC-C Rev. 3.4, Report Date: Dec. 22, 1998, pp. 1-3.

Black Box Corporation, Black Box Network Services, Black Box ServSwitch Duo, Jul. 1998, 52 pages.

Compaq Computer Corporation, Compaq White Paper, "ServerNet—A High Bandwidth, Low Latency Cluster Interconnection," Sep. 1998, pp. 1-9.

JL ChatCom, Inc.—Web Site, JL ChatCom, Inc., ChatterBox Communications and Server Solutions [online], 1996 [retrieved on Dec. 2, 2009], Retrieved from the Internet: <URL: <http://web.archive.org/web/19970104221841/http://www.jlchatcom.com/>>, 1 page.

JL ChatCom, Inc.—Scaleable Application and Communication Servers, "ChatCom, Inc. Announces Complete Line of Scaleable Application and Communication Servers," Aug. 30, 1996 [retrieved on Dec. 2, 2009], JL ChatCom, Inc., ChatterBox Communications and Server Solutions [online], Retrieved from the Internet: <URL:

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.