

(51) International Patent Classification:

G06F 3/06 (2006.01) G06F 13/10 (2006.01)
G06F 15/78 (2006.01)

(21) International Application Number:

PCT/US2022/041189

(22) International Filing Date:

23 August 2022 (23.08.2022)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

63/235,979	23 August 2021 (23.08.2021)	US
17/821,296	22 August 2022 (22.08.2022)	US
17/821,305	22 August 2022 (22.08.2022)	US
17/821,312	22 August 2022 (22.08.2022)	US

(71) Applicant: **APPLE INC.** [US/US]; One Apple Park Way, Cupertino, California 95014 (US).

(72) Inventors: **HAMMARLUND, Per, H.**; One Apple Park Way, Cupertino, California 95014 (US). **ZIMET, Lior**;

One Apple Park Way, Cupertino, California 95014 (US). **KOLOR, Sergio**; One Apple Park Way, Cupertino, California 95014 (US). **LAHAV, Sagi**; One Apple Park Way, Cupertino, California 95014 (US). **VASH, James**; One Apple Park Way, Cupertino, California 95014 (US). **GARG, Gaurav**; One Apple Park Way, Cupertino, California 95014 (US). **KUZI, Tal**; One Apple Park Way, Cupertino, California 95014 (US). **GONION, Jeffry, E.**; One Apple Park Way, Cupertino, California 95014 (US). **TUCKER, Charles, E.**; One Apple Park Way, Cupertino, California 95014 (US). **LEVY-RUBIN, Lital**; One Apple Park Way, Cupertino, California 95014 (US). **DAVIDOV, Dany**; One Apple Park Way, Cupertino, California 95014 (US). **FISH-WICK, Steven**; One Apple Park Way, Cupertino, California 95014 (US). **LESHEM, Nir**; One Apple Park Way, Cupertino, California 95014 (US). **PILIP, Mark**; Kineret 6/6, 2703935 Kiryat Bialik (IL). **WILLIAMS, III, Gerard, R.**; 1833 Fallen Leaf Lane, Los Altos, California 94024 (US). **KAUSHIKKAR, Harshavardhan**; One Apple Park Way, Cupertino, California 95014 (US). **SRIDHARAN, Srinivasa, Rangan**; One Apple Park Way, Cupertino, California 95014 (US). **TAMARI, Eran**; One Apple Park

(54) Title: SCALABLE SYSTEM ON A CHIP

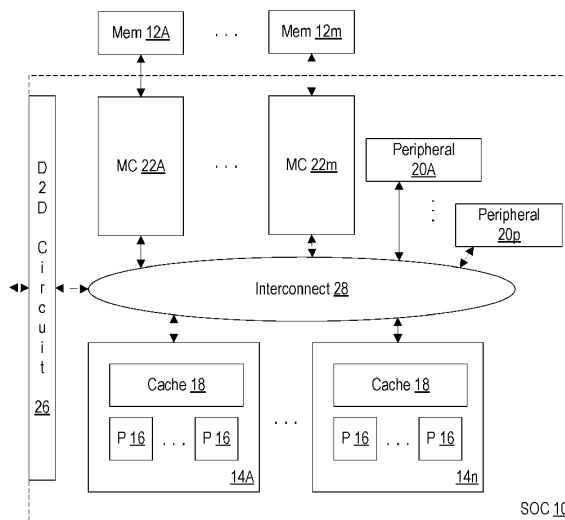


FIG. 1

(57) Abstract: A system including a plurality of processor cores, a plurality of graphics processing units, a plurality of peripheral circuits, and a plurality of memory controllers is configured to support scaling of the system using a unified memory architecture. An interconnect fabric included in the system includes at least two networks having heterogeneous interconnect topologies. The at least two networks include a coherent network interconnecting the processor cores and the plurality of memory controllers.

[Continued on next page]

Way, Cupertino, California 95014 (US). **TOTA, Sergio, V.**; One Apple Park Way, Cupertino, California 95014 (US). **REDSHAW, Jonathan, M.**; One Apple Park Way, Cupertino, California 95014 (US). **HUTSELL, Steven, R.**; One Apple Park Way, Cupertino, California 95014 (US). **FUKAMI, Shawn, M.**; One Apple Park Way, Cupertino, California 95014 (US). **GUNNA, Ramesh, B.**; One Apple Park Way, Cupertino, California 95014 (US).

(74) **Agent: MERKEL, Lawrence, J.**; Kowert, Hood, Munyon, Rankin & Goetzel, P.C., 1120 S. Capital of Texas Hwy, Building 2, Suite 300, Austin, Texas 78746-6464 (US).

(81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))