

# Mohamed Assem Ibrahim

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## RESEARCH INTERESTS

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My research interests lie in all aspects of computer architecture, with a focus on GPGPUs, hardware-software co-design, processing-in-memory, and deep learning acceleration.

## EDUCATION

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- **William & Mary**, *Ph.D.* in Computer Science **Spring 2016 – Spring 2021**  
*Dissertation:* Rethinking Cache Hierarchy and Interconnect Design for Next-generation GPUs  
**Distinguished Dissertation Award in the Natural and Computational Sciences**
- **Cairo University**, *M.Sc.* in Computer Engineering **Fall 2010 – Fall 2015**  
*Thesis:* On Enhancing the Performance of Bufferless Network-on-Chip
- **Cairo University**, *B.Sc.* in Computer Engineering **Fall 2005 – Spring 2010**

## PROFESSIONAL EXPERIENCE

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- **AMD Research**, *Member of Technical Staff*, Santa Clara, CA **Jul 2021 – Present**
- **AMD Research**, *Postdoctoral Researcher*, Santa Clara, CA **Jan 2021 – Jun 2021**  
*Mentors:* Onur Kayiran, Shaizeen Aga  
My role was to conduct research related to analyzing machine learning workloads.
- **William & Mary**, *Research Assistant*, Williamsburg, VA **Jan 2016 – Jan 2021**  
*Advisor:* Associate Professor Adwait Jog  
My role was to conduct research related to large-scale GPU architectures.
- **AMD Research**, *Co-Op Engineer*, Remote **May 2020 – Dec 2020**  
*Mentors:* Onur Kayiran, Shaizeen Aga  
My role was to conduct research related to analyzing graphics workloads.
- **AMD Research**, *Co-Op Engineer*, Santa Clara, CA **May 2018 – Aug 2018**  
*Mentors:* Onur Kayiran, Yasuko Eckert  
My role was to conduct research related to large-scale GPU cache design.
- **Cairo University**, *Research Assistant*, Giza, Egypt **Aug 2010 – Dec 2015**  
*Advisor:* Professor Hatem El-Boghdadi  
My role was to conduct research related to bufferless network-on-chip.
- **Nile University**, *Research Assistant*, Giza, Egypt **Jun 2012 – Jun 2013**  
*Advisor:* Professor Tamer ElBatt  
My role was to conduct research and create functional prototypes related to predictive loading of content on mobile phones based on user modeling.

## PUBLICATIONS

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- [MEMSYS 2021] [Mohamed Assem Ibrahim](#), Onur Kayiran, Shaizeen Aga, *Efficient Cache Utilization via Model-aware Data Placement for Recommendation Models*, In the Proceedings of The International Symposium on Memory Systems (MEMSYS), Virtual Event, September 2021
- [HPCA 2021] [Mohamed Assem Ibrahim](#), Onur Kayiran, Yasuko Eckert, Gabriel H. Loh, Adwait Jog, *Analyzing and Leveraging Decoupled L1 Caches in GPUs*, In the Proceedings of The 27<sup>th</sup> International Symposium on High-Performance Computer Architecture (HPCA), Virtual Event, February 2021
- [PACT 2020] [Mohamed Assem Ibrahim](#), Onur Kayiran, Yasuko Eckert, Gabriel H. Loh, Adwait Jog, *Analyzing and Leveraging Shared L1 Caches in GPUs*, In the Proceedings of The 29<sup>th</sup> International Conference on Parallel Architectures and Compilation Techniques (PACT), Virtual Event, October 2020

- [PACT 2019] Mohamed Assem Ibrahim, Hongyuan Liu, Onur Kayiran, Adwait Jog, *Analyzing and Leveraging Remote-core Bandwidth for Enhanced Performance in GPUs*, In the Proceedings of The 28<sup>th</sup> International Conference on Parallel Architectures and Compilation Techniques (PACT), Seattle, Washington, September 2019
- [ICS 2019] Haonan Wang, Mohamed Assem Ibrahim, Sparsh Mittal, Adwait Jog, *Address-Stride Assisted Approximate Value Prediction in GPUs*, In the Proceedings of The 33<sup>rd</sup> ACM International Conference on Supercomputing (ICS), Phoenix, Arizona, June 2019
- [MICRO 2018] Hongyuan Liu, Mohamed Assem Ibrahim, Onur Kayiran, Sreepathi Pai, Adwait Jog, *Architectural Support for Efficient Large-Scale Automata Processing*, In the Proceedings of The 51<sup>st</sup> International Symposium on Microarchitecture (MICRO), Fukuoka, Japan, October 2018
- [HPCA 2018] Haonan Wang, Fan Luo, Mohamed Assem Ibrahim, Onur Kayiran, Adwait Jog, *Efficient and Fair Multi-programming in GPUs via Effective Bandwidth Management*, In the Proceedings of The 24<sup>th</sup> International Symposium on High-Performance Computer Architecture (HPCA), Vienna, Austria, February, 2018
- [AIM 2017] Hengyu Zhao, Colin Weinshenker, Mohamed Assem Ibrahim, Adwait Jog, Jishen Zhao, *Layer-wise Performance Bottleneck Analysis of Deep Neural Networks*, In the Proceedings of The 1<sup>st</sup> International Workshop on Architectures for Intelligent Machine (AIM), Portland, Oregon, September, 2017
- [HPCA 2017] Xulong Tang, Ashutosh Pattnaik, Huaipan Jiang, Onur Kayiran, Adwait Jog, Sreepathi Pai, Mohamed Assem Ibrahim, Mahmut Kandemir, Chita Das, *Controlled Kernel Launch for Dynamic Parallelism in GPUs*, In the Proceedings of The 23<sup>rd</sup> International Symposium on High-Performance Computer Architecture (HPCA), Austin, Texas, February, 2017
- [MES 2015] Mohamed Assem Ibrahim, Hatem M El-Boghdadi, *Investigating the Viability of Maximum Flexibility Selection Function in Bufferless 2D Meshes*, In the Proceedings of The 3<sup>rd</sup> International Workshop on Many-core Embedded Systems (MES), Portland, Oregon, June, 2015
- [ICC 2014] Omar Shoukry, Mohamed Assem Ibrahim, John Tadrous, Hesham El Gamal, Tamer ElBatt, Nayer Wanas, Yaser Elnakieb, and Mohamed Khairy *Proactive Scheduling for Content Prefetching in Mobile Networks*, In the Proceedings of IEEE International Conference on Communications (ICC), Sydney, Australia, June, 2014
- [MobiSys 2013] Mohamed Assem Ibrahim, Omar Shoukry, Hesham El Gamal, Tamer ElBatt, Nayer Wanas, Mohamed Abdel Raouf, Mohamed Zakaria, Ahmed Abdel Kader and Hakem Zayed *Demo: PAUL Proactive Automated mobile User centric content deLivery*, In the Proceedings of The 11<sup>th</sup> International Conference on Mobile Systems, Applications, and Services (MobiSys), Taipei, Taiwan, June, 2013

## GRANTED PATENTS

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- [US11360891] Mohamed Assem Ibrahim, Onur Kayiran, Yasuko Eckert, Gabriel H. Loh, *Adaptive Cache Reconfiguration via Clustering*.
- [US11068458] Mohamed Assem Ibrahim, Onur Kayiran, Yasuko Eckert, *Mechanism for Distributed-system-aware Difference Encoding/Decoding in Graph Analytics*.
- [US10938709] Mohamed Assem Ibrahim, Onur Kayiran, Yasuko Eckert, Jieming Yin, *Mechanism for Dynamic Latency-Bandwidth Trade-off for Efficient Broadcasts/Multicasts*.

**Note:** Twelve patent applications are filed in USPTO.

## AWARDS and HONORS

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- Spotlight Award, AMD Research
- Distinguished Dissertation Award in the Natural and Computational Sciences, William & Mary [**one recipient per year**]
- Graduate Assistantship, William & Mary