Daniar H. Kurniawan

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Research Interests: **Machine Learning** and Distributed **Systems** (**Reliability, Scalability, and Performance**)

Education

2018 - Present **Ph.D. in Computer Science** at University of Chicago, Chicago, IL, USA
Advised by Professor **Haryadi S. Gunawi**

2012 - 2017 **B.S. in Computer Science** at Institut Teknologi Bandung, Bandung, Indonesia
Graduated with a **cum laude** distinction

Publications

2019 Xu Zhang, Siddhartha Sen, **Daniar H. Kurniawan**, Haryadi S. Gunawi, and Junchen Jiang. **E2E: Embracing User Heterogeneity to Improve Quality of Experience on the Web** in Proceedings of the ACM Special Interest Group on Data Communication 2019 (**SIGCOMM'19**)

2019 Jeffrey F. Lukman, Huan Ke, Cesar A. Stuardo, Riza O. Suminto, **Daniar H. Kurniawan**, Dikaimin Simon, Satria Priambada, Chen Tian, Feng Ye, Tanakorn Leesatapornwongsa, Aarti Gupta, Shan Lu, and Haryadi S. Gunawi. **FlyMC: Highly Scalable Testing of Complex Interleavings in Distributed Systems** in Proceedings of the 14th edition of The European Conference on Computer Systems 2019 (**EuroSys'19**)

2017 Riza O. Suminto, Cesar A. Stuardo, Alexandra Clark, Huan Ke, Tanakorn Leesatapornwongsa, Bo Fu, **Daniar H. Kurniawan**, Vincentius Martin, Uma Maheswara Rao G., and Haryadi S. Gunawi. **PBSE: A Robust Path-Based Speculative Execution for Degraded-Network Tail Tolerance in Data-Parallel Frameworks** in Proceedings of the ACM Symposium on Cloud Computing 2017 (**SoCC'17**)

2017 **Daniar H. Kurniawan** and Yani Widyani. **Sci-Learn: A Novel E-Learning Platform Based on Gamification and Social Media Approach** in Proceedings of the International Conference on Electrical Engineering and Informatics 2017 (**ICEEI'17**)

2016 **Daniar H. Kurniawan** and Rinaldi Munir. **Double Chaining Algorithm: A Secure Symmetric-key Encryption Algorithm** in Proceedings of the International Conference on Advanced Informatics: Concepts, Theory and Application 2016 (**ICAICTA'16**)

2016 Shinobu Hasegawa and **Daniar H. Kurniawan**. **Development of Multi Agent for Test of Recommendation Functions on Social Learning Platform** in Proceedings of the Institute of Electronics, Information and Communication Engineers 2016 (**IEICE'16**)

2015 **Daniar H. Kurniawan** and Rinaldi Munir. **A New String Matching Algorithm Based on Logical Indexing** in Proceedings of the International Conference on Electrical Engineering and Informatics (**ICEEI'15**)

Posters

2017 Riza O. Suminto, Cesar Stuardo, Alexandra Clark, Huan Ke, Tanakorn Leesatapornwongsa, Bo Fu, **Daniar H. Kurniawan**, Vincentius Martin, and Haryadi S. Gunawi. **PBSE: A Robust Path-Based Speculative Execution for Degraded-Network Tail Tolerance in Data-Parallel Frameworks.** The 8th ACM Symposium on Cloud Computing (**SoCC'17**)

2016 Riza O. Suminto, Cesar Stuardo, Alexandra Clark , Huan Ke, Bo Fu , Tanakorn Leesatapornwongsa, Vincentius Martin, **Daniar H. Kurniawan**, and Haryadi S. Gunawi. **PBSE: Path-Based Speculative Execution for Robust Tail Tolerance in Data-Parallel Systems.** The 12th USENIX Symposium on Operating Systems Design and Implementation (**OSDI'16**)

2016 Tanakorn Leesatapornwongsa, Cesar Stuardo, Huan Ke, Jeffrey F. Lukman, Riza O. Suminto, **Daniar H. Kurniawan**, and Haryadi S. Gunawi. **SCk: Scale-Checking and Debugging Scalability Bugs on One Machine**. The 12th USENIX Symposium on Operating Systems Design and Implementation (**OSDI'16**)

Experience

Research Assistant at **The University of Chicago**, Chicago, USA — Aug'18 – Present
- Current project: **Improving Systems with Machine Learning**
- Past project: **Cutting Millisecond Tail Latency** with Fast-Rejecting GC-Aware Java Interface.

Research Intern at **VMware Research**, California, USA — Jun'20 – Sep'20
- I work on Hillview project, a cloud-based service for **visualizing interactively large (billion-row) datasets.** I integrate **Hillview with Cassandra and Hive** to visualize the stored data within a cluster.
- Mentor: Mihai Budiu.

Research Intern at **Microsoft Research**, New York, USA — Nov'18 – Dec'18
- I was working on E2E project **(published at SIGCOMM'19)**.
- E2E is a **resource allocation system that optimizes QoE by exploiting user heterogeneity** such as prioritize the handling of a request based on how sensitive the user's QoE is to the delay.
- I **extracted the insight of end-to-end traces** from Microsoft's cloud-scale production web framework.

Research Student at **GIK Lab**, Bandung, Indonesia — Sep'15 – May'18
- This is a remote **research mentorship program** for talented Indonesian students in collaboration with systems group at the University of Chicago.
- I focused on **studying performance bugs and cascading-failure bugs** at cloud computing and distributed systems **(Hadoop, Cassandra, Couchbase, and Spark).**

Research Student at **CERN**, Geneva, Switzerland — Jul'17 – Sep'17
- There were only 37 international students selected among 1580 applicants from all around the world.
- I am collaborating with **UNOSAT** to investigate novel technologies for facilitating **satellite maps navigation using VR** (Virtual Reality).
- I developed an animated 3D model of Ab-Barak landslide on **Microsoft Hololens.**

Visiting Student at **Toyohashi U. of Tech.**, Toyohashi, Japan — Nov'18
- I **shared my research** experience in distributed-systems and distance learning.

Research Student at **Japan Advanced Inst. of Science and Tech.**, Japan — Dec'15 – Feb'16
- We were developing Sci-Learn (Scientific-learning), an e-Learning/**distance learning platform**, and also the multi agent system to simulate user's behavior and evaluate the new feature of Sci-Learn.
- The main idea of Sci-Learn is to combine Social Network's features such as Facebook, LinkedIn, and Google+ to **increase learners' engagement** by putting gamification on top of it.

Software Engineer (Intern) at **Multibook Inc.**, Tokyo, Japan — Sep'15 – Nov'15
- Since the main business of this company are SAP consulting service, my task was **evaluating their database architecture** and running software testing for their new ERP System, named Multibook.
- **Implementing authentication module** in Spring Framework controller and Angular JS controller that will be used at more than 50 modules.

Software Engineer (Intern) at **GDP Venture Inc.**, Jakarta, Indonesia — Jun'15 – Jul'15
- GDP Venture is one of the leading strategic investors located in Jakarta.
- I was **investigating their new database architecture design** and purpose some changes, including optimizing their database queries (**reduced 50% query time**) and **migrating the databases to Amazon Redshift** resulting in 14x faster query time.

Talks

2017 **Sci-Learn: A Novel E-Learning Platform Based on Gamification and Social Media Approach** at International Conference on Electrical Engineering and Informatics **(ICEEI)** in Langkawi, Malaysia.

2017 **Developing Augmented Reality 3D Model of Ab Barak Landslide on Microsoft Hololens** at The European Organization for Nuclear Research **(CERN)** Openlab Summer Student Lightning Talks in Meyrin, Switzerland.

2016 **Double Chaining Algorithm: A Secure Symmetric-Key Encryption Algorithm** at International Conference on Advanced Informatics: Concepts, Theory and Application **(ICAICTA)** in Penang, Malaysia.

2015 **A New String Matching Algorithm Based on Logical Indexing** at International Conference on Electrical Engineering and Informatics **(ICEEI)** in Bali, Indonesia.

Teaching Assistantship

- CMSC 154: Introduction to Computer Systems, at UChicago — Spr'19, Aut'19, Spr'20
- CMSC 152: Introduction to Computer Science, at UChicago — Win'20
- CMSC 230: Operating Systems, at UChicago — Aut'20

Awards

2018	ACM SoCC'18 travel grant
2018	CERES outstanding 1st year student award
2017	Graduated (B.S) with cum laude distinction
2017	Third place at Webfest 2017, CERN's annual hackathon
2015	First place at IBM business plan competition, won USD7000
2013	Full undergraduate scholarships supported by BIUS, SDF, and KSE

Projects

Hillview+	I extend Hillview's capability by integrating it with distributed storage systems (Cassandra and Hive). Evaluated on 15 nodes cluster with ~200 million rows dataset, **Hillview+ is 6-9x faster** than vanilla Cassandra because it **reads the data directly from SSTables** in parallel.	2020
MittMem	I modify **JVM Hotspot** to keep a single thread (SpecialThread) alive during FullGC. The SpecialThread is able to escape the Safepoint check and has its own static heap. I **integrate MittMem with Cassandra** to evaluate its performance.	2019
E2E	I **perform big data analysis** over end-to-end traces (almost 1 TB) from Microsoft's cloud-scale production web framework. In addition, I build a toy sample on **Cassandra and RabbitMQ** for evaluating E2E.	2018
FlyMC	I **integrate model checker (SAMC) with Spark** and **reproduce some concurrency bugs**. I also **modify the SAMC to run 4x faster** by configuring additional threads.	2017
PBSE	I implement and evaluate PBSE on **Spark** by **modifying its data path**. The experiments is done using **Emulab Cluster**.	2016
SCk	I evaluate the systems in a **HDFS** cluster **(up to 256 nodes) using Chameleon Cluster.**	2016
Sci-Learn	I develop and deploy a **web solution for distance learning** from the ground up using **NodeJS and MongoDB**.	2016
Bug Study	I **study and reproduce (scalability, concurrency, and performance) bugs** in various storage systems such as **Spark, Hadoop. Cassandra, HBase, HDFS, Couchbase, BerkeleyDB, and Voldemort**.	2015

Technical Skills

Testbed	Emulab Cluster, Chameleon Cloud
OS	**Hacking** Linux kernel
Systems	**Hacking :** Spark, Hadoop, Hive, Cassandra, Couchbase. **Using :** ZooKeeper, HDFS, HBase, BerkeleyDB, Voldemort
DB	MongoDB, MySQL, PostgreSQL, Amazon DynamoDB, Amazon Redshift
ML/AI	Tensorflow, Keras, PyTorch
IoT	Arduino
Runtime	**Hacking** JVM (hotspot, garbage collection)
PL	Java, Python, C/C++, C#, Assembly, Scala, PHP, HTML, CSS, JavaScript, JQuery

References

Haryadi S. Gunawi — Associate Professor, Computer Science, University of Chicago
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Junchen Jiang — Assistant Professor, Computer Science, University of Chicago
junchenj@uchicago.edu