Ankit Bhardwaj

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Education

Examination	University	Institute	Year	CPI/%
Post Graduation	IIT Bombay	IIT Bombay	2013-2015	7.94
Graduation	MDU,Rohtak	SITM,Rewari	2007-2011	74.38

Research Interests

I am interested in systems with broad interests in cloud computing, large scale systems, and operating systems.

Professional Experience

- Currently working as a Research Asso. at Cloud and HPC Lab, IIT Delhi *(Jan 2017 - Present)*
- Software Engineer at DELL EMC India Pvt. Limited *(Aug 2015 - Jan 2017)*

Publications

- **Ankit Bhardwaj**, Atul Shree, Bhargav Reddy V, and Sorav Bansal. 2017. A Preliminary Performance Model for Optimizing Software Packet Processing Pipelines. In Proceedings of the 8th ACM SIGOPS *Asia-Pacific Workshop on Systems (APSys 2017).*

Research Projects

- **Modeling and optimization of software packet processing pipelines** *(ongoing work)*
  - The goal of the project is to model the software based packet processing pipelines and use the model to reason about the optimizations transformation for compilers.
  - Used P4(DSL) to write network processing pipelines and transformed into optimized DPDK based applications with the help of a compiler.
  - Initial work was published at APSys 2017 and planning to submit extended work at some top tier conference(plan to submit for SIGCOMM 2018).

- **Implement vSphere APIs for Storage Awareness (VASA)**
  - Implemented VASA Provider as a SOAP based web-service using Java 8 and Spring Framework. Used Spring-Boot to start the embedded tomcat container for it.
  - Learned and used VMware host virtualization solutions (vSphere, vCenter, ESXi etc).
  - Learned about various types of certificate based authentication and used truststore, keystore and SSL certificates to implement secure web service.
  - Created a jar and packed the jar into rpm to make it easy to install on different systems. Added an init.d script in the rpm to start/stop/restart the service as a Linux daemon.

- **vLab: Managing and Provisioning Virtual Machines for Labs** *(M.Tech Project)*
  - **Objective:** *To engineer,manage, measure and design solutions for a setup where each student will get a VM for lab work*
  - **Challenge:** Hundreds of VM all booting up at, or near, the same time can cause a huge drag on network throughput, storage I/O and host server performance
  - **Solution:** Used Sheepdog, Cluster Storage System, to distribute the storage capacity and performance requirement across machines and Libvirt API to access KVM/Qemu for managing VMs on different machines in the cluster. Performed various experiments needed for architecture design and to measure system's performance.

Academic Projects

- **VM based Record and Replay and Co-location Detection** *(M.Tech Seminar)*
  - Compared various techniques for record and replay of VMs and their usecases like intrusion detection,fault tolerance,debugging etc.
  - Studied and compared various techniques to co-locate the VMs on same physical machine and explored about various possible attacks due to co-location of VMs.
- **Design of Key-Value Store With Raft Consensus Algorithm** *(Guide: Prof. Sriram Srinivasan)*
  - Implemented Key-Value store in Go language and used this in a cluster setup.
  - Used ZMQv4 library for communication purpose at socket level.
  - Leader election and log replication among the nodes in the cluster was done using Raft consensus algorithm.
- **Implementation of Table Partitioning in PostgreSQL** *(Guide: Prof. S. Sudarshan)*
  - Modified source code of PostgreSQL to provide syntactic support for table partitioning.
  - Provided support for range partitioning and list partitioning to speed up the query processing time for large tables.
  - Insertion,Deletion and Update of tuples in partitioned tables was done using triggers.
  - Created index(s) in the partitioned tables if one is present in original table.
- **Design and Evaluation of Balloon Controllers** *(Guide: Prof. Purushottam Kulkarni)*
  - Designed and implemented an automated balloon controller to control the memory for VMs using both Gray box and Black box approach in Go and Python language.
  - Used various Virsh commands to control the memory for VMs running on KVM hypervisor.
- **Understanding Network Performance in Dense WiFi Settings** *(Guide: Prof. Mythili Vutukuru)*
  - Analysed various statistics and real time parameters from a real trace file, which was generated while downloading a file in a wireless setup, using Python.
  - Simulated the same experiment using NS-3 simulation tool and analyzed the parameters for network trace file of simulated experiment and enhanced simulation model to reflect real life scenario.
- **Profiling Tool in Linux Kernel** *(Guide: Prof. Purushottam Kulkarni)*
  - Learned various aspects about accessing performance counters in the x86 architecture.
  - Put hooks at some places in the kernel to get the value of L1 cache hits/misses, uops counts, TLB hits/misses for a process and created a linux kernel module to access performance counters and to show the output in the syslog.
  - Used Perf tool to verify the output.

Positions of Responsibility

- **Member of Institute Student Companionship Program, IIT Bombay** *(July 2014 - June 2015)*
  - Responsibility of an ISCP member is to mentor new M.Tech entrants in their academic and non-academic matters. As a member I mentored 4 (M.Tech-1) students.
- **Teaching Assistantships, IIT Bombay**
  Involves mentoring students, conducting quizzes, grading assignments, and exams.
  - Operating System Lab *(Spring 2015)*
  - Implementation Techniques for Relational Database Systems *(Autumn 2014)*
  - Computer Programming and Utilization *(Autumn 2013 and Spring 2014)*

Conferences/Presentations

- A Preliminary Performance Model for Optimizing Software Packet Processing Pipelines, presented both the paper and poster at ACM SIGOPS *Asia-Pacific Workshop on Systems (APSys 2017)*.

Achievements & Extra Curricular Activities

- Awarded with **Excellence@Dell Silver level award** for my work in VASA Project.
- Secured All India Rank 57 among 2,24,160 candidates appeared in Graduate Aptitude Test in Engineering, 2013 CSE
- Won Silver Medal in Volleyball at intra-college level (2010) as a team.
- Interests: Reading novels, Listening to music, Cycling

References

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