ANKUR SAHAI

ankur.sahai@gmail.com
+1 (650)-863-6436

OBJECTIVE   Seeking a challenging research position involving problem solving in the field of Algorithms, Distributed Systems and Operating Systems.

EDUCATION   **M.S., Computer Science**   **University of Southern California (USC)**
Los Angeles, 2005-07

B.Tech., Computer Science and Engineering   **Pondicherry University**
Top 1% in University amongst > 2000 peers in Engineering   India, 2001-05

RESEARCH PROJECTS   DISTRIBUTED STORAGE PROVISIONING FOR VMS RUNNING ON VIRTUAL CENTER, Virtual Infrastructure Management *(VIM)* Team, VMware Inc., Palo Alto, CA, Summer 2006

As a summer intern, I researched distributed storage management for virtual machines running across hosts on Virtual Centre. I designed an abstract layer for storage management based on a scalable and efficient algorithm that operates on a tree-like data-structure. This layer aggregates and virtualizes the storage available in the Virtual Centre into storage resource pools.

This algorithm handles different scenarios like adding, removing (associated storage of) a VM or a storage resource pool. Minimum and maximum quotas are used to allocate storage amongst the users of the VM in a fair manner.

USING REMOTE STORAGE TOWARDS ENERGY SAVINGS IN SENSOR NETWORKS [*] , Advanced topics in Networks, Distributed systems(CS 694, A-), USC, Fall 2006

I proposed an energy-saving configuration for the sensor networks that uses remote storage. The motes in sensor network applications requiring very high sensing-rates need to transmit the data at frequent intervals in order to avoid local storage overflow. This consumes high amount of energy.

Remote Storage uses nodes with higher storage capacity distributed over the network to alleviate this problem by having the motes send their data to the nearest such node. Given the pre-configured location of motes in a sensor network and a load balancing parameter, it is possible to achieve energy savings by placing the nodes with higher storage capacities in a specific manner.We use some randomized algorithms to find such energy saving configurations.

This paper also proposes a communication protocol that adapts to the sensing rate of the motes to increase their life-times. The results demonstrate a ten fold energy savings when the sensing-rate adaptive protocol is run on top of an energy saving configuration as compared to a network without remote storage.

A SPECULATIVE APPROACH TO DEADLOCK HANDLING [*],Advanced Operating Systems(CS 555, A), USC, Spring 2006

I investigated distributed deadlocks and techniques to handle them. I designed an algorithm to proactively detect deadlock cycles in a distributed system based on the information about the processes and the resources that they access. Machine learning techniques are used on-the-go to learn about the processes. This information is stored in a knowledge base as rules and used to predict deadlocks

[*]electronic copy of research papers is available upon request

USING TRUSTED COMPUTING TO DETECT VM ROOTKITS * ,Security Systems(CS 530, A), USC, Fall 2006

I analyzed a security protocol to detect VM Rootkits using a trusted module on the system that communicated with a trusted server. The trusted module generates information about the software currently running on the system. The trusted server uses the data transmitted from the trusted module along with the information about the Rootkits to detect Rootkit attacks on the system.

This protocol covers security issues such as man-in-the-middle, brute-force, replay, denial-of service and other hardware attacks

ANALYSIS OF CENTRE-BIAS AS A CHARACTERISTIC OF HUMAN VISION, iLAB * ,Directed Research Student (UNDER PROFESSOR LAURENT ITTI), USC, Spring 2006

I researched the human vision using a computational model(Itti & Koch). I observed that humans tend to focus on the centre while looking at a video clip by using the visual responses collected using the eye-tracker apparatus at iLAB. The aim of this project was to figure if this is because most of the interesting stuff is located at the centre of the video or if it is a feature of human vision.

To study this feature, I collected video clips from various locations in Los Angles with pan (horizontal movement), tilt (vertical movement) and random motions of the camera. Then I showed these video clips to human subjects and collected their responses using the eye-tracker apparatus at iLAB.

I gave genuine suggestions to improve the computational model of vision based on Bayesian learning i.e. what we look at now guides what we look at in the future. I attended the talks given by Prof. Koch and his team from Caltech.

A GEOGRAPHICAL INFORMATION SYSTEM(GIS) FOR USC TRANSPORTATION, Advanced Database Systems(CS 585, B+), Spring 2006

I implemented a Oracle database that stores information about the public transportation at USC. The GIS uses a parser based on XQuery that reads the data from XML files and updates the database (XML ->SQL conversion) dynamically. The implementation allows a user to make "spatial queries" using a front-end GUI to get such upto-date information as the available trams, their routes, current positions etc. within a specified area.

SIMULATION OF NETWORK QUEUES FOR INTERNET TRAFFIC WITH PARETO DISTRIBUTION, Probabilistic methods in Computer Systems Modeling(EE 465, B+), Fall 2005

I analyzed the flow of internet traffic using queuing models. I investigated the network queues for heavy-tailed network traffic with Pareto distribution. I simulated the M/M/n/n and M/G/n/n queues with FIFO and LIFO service discipline.

SUB-SURFACE SCATTERING FOR 3-D IMAGES, 3-D Graphics and Rendering(CS 580, B), USC, Fall 2006

Designed and implemented algorithms for sub-surface scattering in 3-D images. I researched the sub-surface scattering phenomenon by modeling the interaction of light rays with translucent materials using color bleeding, diffusion, scattering, reflection, and refraction phenomenon. This model is built on top of conventional ray-tracer.

---

*electronic copy of research papers is available upon request

WORK EXPERIENCE	**Independent Consultant in Concord, CA** Software Consultant

<div align="right">February 2010-Present</div>

Designed a cocoa application using Objective C for capturing and displaying live video from Webcam in a GUI with adjustable settings

- Wrote a device-driver for generic UVC webcam using Mac's USB and IO libraries.
- Designed an application that captures video using QTKit libraries.
- Developed a GUI using Cocoa that is used for controlling webcam settings - brightness / contrast / color / encoding, capturing video and screenshot

Designed a BlackBerry application using Java for sending XML work orders via e-mail based upon UI components selected

Developed an Android application for playing image / video advertisements over streaming internet radios

---

Research In Motion, Redwood City, CA, USA **Software Developer**

<div align="right">January 2009-January 2010</div>

Designed E-Commerce applications - eBay, TicketMaster using Java for BlackBerry operating system

- eBay application is used to Search, Bid, Buy, Watch and Add and Item to Calendar
- Ticketmaster application is used to search for events under different locations, categories - Family, Sports
- eBay app sends push-notifications for outbid, won for the items in Watch list
- Java native applications that uses SOAP and REST APIs to communicate with eBay and TicketMaster Server
- Omniture tool is used for collecting statistics - search count and bid count

Automation framework for - eBay and TicketMaster

- Input configuration file containing - build number, device password, test case names, number of iterations, reference screenshot location, location for saving log file, eBay account info, Item ID, bid amount, number of items to buy, PayPal account info., Ticketmaster event name, type / number of tickets, credit card information.
- Loads the build from the internal build website on Blackberry
- Executes test cases specified in the configuration file
- Image-comparison and Debug messages are used for validating test case results
- Sends an e-mail containing test results
- Wrote a PHP script for automated discovery of new Ticketmaster pages.

E-Commerce Content Optimization Engine (ECOE) Client and Server test automation

- Input configuration file containing - build number, device password, test case names, number of iterations, reference screenshot location, location for saving log file, eBay account info, Item ID, bid amount, number of items to buy, PayPal account info., Ticketmaster event name, type / number of tickets, credit card information.
- Implemented ECOE Client test cases using Java and used an internal tool for automation on device.
- Implemented ECOE Server test cases using Bash scripts and used Crontab for automation on Linux.
- Wrote bash scripts for automated installation of ECOE server using Java JDK, Apache, Tomcat, PHP, EAccelerator

Tools: BlackBerry JDE, JavaLoader, BlackBerry Desktop Manager, BlackBerry Simulator, PHP, XML, Apache server, Perforce

---

Apple, Cupertino, CA   **Engineer**
                                                November 2008-December 2008

Analyzed Acoustics data for Apple devices using a Matlab GUI for plotting different parameters e.g. Sound pressure Vs. Frequency and added the following features:

- Reading data-sets from MAT file and displaying it in a list-box

- Adding data-sets to a selected plot / removing data-sets from a selected plot

- Plotting 2-D graphs for specified data-sets

- Selecting different styles for the plot - color, line style, data point style, interpolation types, transparency level, legend position, zoom type, labels for cursor

- Saving one or more plots in a specified format - JPEG, BMP, TIFF, Matlab FIG, PDF, PostScript, Excel file - containing plot data

---

Adobe Systems, San Francisco, CA   **MTS, Software Development**
                                                    August 2007-October 2008

Designed and tested audio, video, image decoding, HTTP, file, memory and buffer management, rendering, interrupt handling APIs from Adobe Mobile Client

Unit Test Framework (UTF)

- Designed a platform independent Unit Test Framework (UTF) used for running C/C++ unit test cases to test Adobe Mobile Client (AMC) APIs. This framework is based on asynchronous callbacks between a mock core component and the platform component.

- Extensively used Object Oriented Analysis and Design concepts to design the UTF.

- Created modules for custom management of AMC's HTTP, Image decoding, Video frame buffer and Data services interfaces.

- Wrote libraries for memory management, string handling and error logging for UTF.

- Implemented a lock ordering mechanism to prevent deadlocks.

- Designed C/C++ unit test cases for AMC APIs.

UTF for Windows

- Used Windows Messaging loop and Win32 APIs to run the UTF on Windows

- Created batch files to setup the test environment on Windows

- Wrote XML test media used by certain AMC APIs

UTF for BREW

- Designed a stand-alone application in VC++ to run the UTF on BREW OS

- Implemented a custom BREW event-handler for events specific to AMC interfaces

- Used ARM compiler / makefiles to generate ELF / MOD files for testing on the mobile device

Scenario testing and Automation

- Designed black box test media using the Flash / Actionsript for testing on the mobile devices

- Carried out code coverage analysis for AMC using Flash / Actionscript test media to get the function / decision coverage for AMC interfaces

- Analyzed and suggested improvements to the local storage and text features of the AMC

- Setup and configure the Adobe Mobile Server using custom bash scripts on Solaris platform

Tools: Visual C++, BREW SDK, Tools Suite, ARM compiler, Makefiles, BullsEye Code Coverage, Batch files, Visual Assist, Motorolla RSD Lite

---

Vmware, Palo Alto, CA   **Member of Intern Technical Staff, R&D**
May 2006-August 2006

Designed and implemented distributed storage provisioning for the virtual machines running on Virtual Centre as a new feature

Design and Testing

- Analyzed the performance of different designs for managing the storage for VMs running across hosts using C++ simulations

- Designed and implemented the core of the abstract storage management layer in C++

- Virtualized the storage available in the Virtual Centre into storage resource pools

- Implemented a tree-like structure for efficient and scalable management of the distributed storage resources

- Implemented fairness routines to distribute the storage amongst the VMs. These algorithms provide a MIN and MAX quotas per user

- Added support for moving VM's storage across clusters using the VMotion technology

- Wrote APIs for the Distributed storage provisioning feature to add / remove / move VM storage, add / remove datacenter from storage resource pool

- Used Python scripts to configure the storage on the data centers

- Tested the design using unit and scenarios test cases

Tools: Visual C++, STL, Makefiles, Python, VMware ESX servers, VMPlayer

---

TECHNICAL SKILLS

Programming Languages: C/C++, Java, ActionScript / Flash, Objective C, Perl, Python, PHP, Prolog

Operating Systems: Unix/Linux, Windows, Mac, Solaris, BREW, Android, Blackberry, Symbian

Database tools: Relational, Object-Relational, Spatial (Index structures) and Multidimensional (OLAP) databases, Oracle/SQL, JDBC, ODBC; front ends (GUIs) - Java, NetBeans, JBuilder

Web technologies: Apache, Tomcat, PHP, SOAP, REST

Java tools: Applets, AWT & Swing, Eclipse

Editors: vi, emacs, LaTeX, VS IDE

AWARDS

- Top *4%* amongst $> 30,000$ students in the National level post-bachelor qualification Graduate Aptitude Test for Engineering (*GATE*) examination.

- Awarded the prize for the *best scenario application* in the Adobe Mobile Application Development Contest.

- Ranked 5th in the entrance examination for Master of Technology program at the *Indian Institute of Information Technology* and granted Human Resource and Technical Assistance (HRTA) scholarship support for the entire duration of the course.

- Stood 1st in the Computer Science graduate qualification in Pondicherry University.

REFERENCES   References are available upon request