King Fahd University of Petroleum and Minerals
College of Computer Sciences and Engineering
Department of Computer Engineering

COE 547/CSE 552 – Network Management (T141)

Term Project

Wednesday, September 17th, 2014

1 Introduction

Students will work throughout the semester, preferably in teams of two, on a project in the area of network management. They will be expected to survey the related work and then design and implement a prototype for their system. They will have to deliver a term paper, a presentation and a demo of their work at the end of the semester.

2 Project Description

The goal of this project is to design and implement an SNMP manager with a specialized function. You can use for this purpose any tool that you prefer. Initially, you need to implement the basic SNMP messages to be able to communicate with agents. In addition, you can test your application with already existing agents. This should include the implementation of a MIB. Other issues to be investigated include the different levels of access control, in addition to preserving the privacy of any information that needs to be protected. Developing this as a web-based tool would be a plus.

The students will choose one of the following projects to work on. They may alternatively define a similar project after consultation with the instructor.

- **Topology Discovery Tool:** The goal of this project is to develop a tool for discovering the topology of a network including internetworking devices such as routers and switches, and end systems such as servers and workstations. The project will investigate the different options for the discovery of elements in the network and the visualization of the network topology. Then, the most appropriate option will be chosen for a better view of the network topology.

- **Performance Monitoring Tool:** The goal of this project is to develop a tool for reporting and visualizing data and statistics collected on a network. The project will investigate the different options for the generation of reports and the visualization of statistics for monitored parameters in a network. Then, the most appropriate option will be chosen for a better view of the network traffic.

- **Fault Monitoring Tool:** The goal of this project is to develop a tool for reporting and visualizing alarms and faults on a network. The project will investigate the different options for the reporting of faults and the correlation of alarms received from different network elements in a network. Then, the most appropriate option will be chosen for a better view of the faults in a network.

3 Project Expectations

The outcome of the project must be a working prototype that you can demonstrate at the end of the semester.

Your grade will be based on the amount of work accomplished and the number and efficiency of the components implemented. The demonstration represents ~35% of the overall project grade.

You need to follow these steps in your project:

- Survey of different options, and choice of one
- Plan of implementation of the option chosen
- First prototype of the proposed system
- Term paper and user manual
- Demo of the final implementation
- Presentation

4 Project Deliverables

The following are the deliverables expected from each team and the due date for each.

	Deliverables	**Due date**	**Grade's weight**
1	First progress report	Monday, November 10th, 2014 (wk 9)	**5%**
2	Second progress report	Monday, December 01st, 2014 (wk 12)	**10%**
3	First Demo	December 01st – 03rd, 2014 (wk 12)	**5%**
4	Final demo	December 22nd – 24th, 2014 (wk 15)	**30%**
5	Presentations	December 22nd – 24th, 2014 (wk 15)	**15%**
6	Term paper	Monday, December 22nd, 2014 (wk 15)	**30%**
7	User manual	Monday, December 22nd, 2014 (wk 15)	**5%**

4.1 First Progress Report

The first progress report should include the following sections:

- Introduction (including motivations and objectives)
- Background and Terminology
- Related Work
- Proposed Work
- Prototype Architecture and Design (draft version)
- Summary
- Updated Plan (including tasks distribution)
- References

It is very important to have a thorough understanding of the related research work. Study and cite all related papers. Do not simply copy the conclusions drawn in a paper; use your own assessment and intuition to verify the results and make your own judgment. An effective review

of related research is not one that mentions everyone working in a particular area of research but it is one that classifies the area appropriately and discusses pros and cons of each class to justify one's own research.

The first progress report should not exceed 8 single-column pages with at least 12 point font and at least 1.5 line spacing.

A meeting with the instructor will be scheduled during the same week to discuss your progress.

4.2 Second Progress Report

The second progress report should include the updated version of the first report contents incorporating any feedback from the instructor, in addition to other sections as follows:

- Introduction (including motivations and objectives)
- Background and Terminology
- Related Work
- Proposed Work
- Prototype Architecture and Design (including subsections on components design and interactions between them)
- Implementation (including tools used, classes, etc.) (Phase 1)
- Functionality and Utilization (including how the system can be used, for which applications, and by which companies, etc.) (Phase 1)
- Experimental Setup (Phase 1)
- Evaluation and Results (Phase 1)
- Conclusion (Phase 1)
- Updated Plan (including tasks distribution)
- References

The second progress report should not exceed 12 single-column pages with at least 12 point font, and at least 1.5 line spacing.

4.3 First Demo

A demo of the first phase of your prototype will be scheduled with the instructor during the same week of the second progress report. This first demo will be evaluated based on the functionality and the limitations/problems/errors in the first phase of the prototype.

4.4 Final Demo

The final demo will be evaluated based on the functionality and the limitations/problems/errors in the prototype. Partial credit will be given depending on the level of accomplishment and the degree to which the final prototype has been completed and tested.

In the demo, you need to show how your system works. Basically, what input you give, what output you get, and how the information is being processed. You do not necessarily need to show all the details of the system. You may be asked, however, to show some parts of the code as well (as needed). If there are any data collected, stored, etc., then you need to show that as well.

4.5 Class Presentation

The project presentations will be scheduled during the last week of classes. Each presentation will be 20 minutes long. Each team needs to do the following:

1. Prepare slides covering an introduction, review of related work, description of the proposed work and the prototype, implementation and experiments, and discussion of the results.
2. Send an abstract of the talk to the instructor (marwan@kfupm.edu.sa) at least one day before the talk.
3. Demonstrate the working of your prototype to the instructor before the presentation.

4.6 Term Paper and User Manual

You are expected to submit the term paper, the user manual, and the code commented by the deadline. You can either have everything in a CD or send it to the instructor by email as a .zip file (if the file size is not very big). A hard copy of the term paper and the user manual has also to be submitted to the instructor by the same deadline.

The term paper should be written as a professional-quality technical paper. Thus, the paper should be self-contained. It should start with an abstract and include a list of references. Look at any IEEE transactions paper to understand the format of references and other material. The paper should not exceed 20 single-column pages with at least 12 point font and at least 1.5 line spacing. You can choose your favorite word processor to produce this paper.

The term paper should include the following main sections:

- Abstract
- Introduction (including motivations and objectives)
- Background and Terminology
- Related Work
- Proposed Work
- Prototype Architecture and Design (including subsections on components design and interactions between them)
- Implementation (including tools used, classes, etc.)
- Functionality and Utilization (including how the system can be used, for which applications, and by which companies, etc.)
- Experimental Setup
- Evaluation and Results
- Future Directions
- Conclusion
- Updated Plan (including tasks distribution)
- References

The term paper will be graded as follows:

Clearly stated background and rationale of work	**10%**
Breadth and depth of the critical review of related research	**30%**
Technical content (architecture, design, implementation, analysis of results, etc.)	**50%**
Paper organization	**10%**

The user manual should include all information and steps necessary for someone to install and use your prototype. If this requires installing and configuring tools/applications which are not usually installed by default, then you should include the configurations steps for these as well. You may also include snapshots as needed. The grade for the user manual also includes the code structure and comments.

5 Late submission policy

All assignments (e.g., project reports) submitted after the due date will have a grade of 0.

6 References

- http://www.caida.org/tools/: The CAIDA Tools site contains CAIDA tools and software as well as a taxonomy of available research and visualization tools.
- http://www.simpleweb.org/: provides links and information on network management, including software, RFCs and tutorials.
- http://www.simpleweb.org/software/: The SimpleWeb Network Management Software site provides links to commercial and freely available SNMP (and other) software packages.
- http://net-snmp.sourceforge.net/ (Previously known as "ucd-snmp"): Various tools relating to the Simple Network Management Protocol
- http://linas.org/linux/NMS.html: Linux SNMP Network Management Tools
- http://www.slac.stanford.edu/xorg/nmtf/nmtf-tools.html: Network Monitoring Tools
- http://www.topology.org/comms/netmon.html: Network Traffic Monitoring
- http://www.sce.carleton.ca/netmanage/resources.htm#links: NM Research Web resources
- http://www.mibexplorer.com/
- Chapters 9 & 11 of the textbook
- Google ☺