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Telecommunications network management laboratory

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Abstract

This work discusses network management laboratory design and implementation at the University of Wollongong in the School of Electrical, Computer and Telecommunications Engineering in years of 2002 and 2003 for a final year specialisation subject called telecommunication network management for telecommunications engineering students. The design and implementation included that of a network management GUI incorporating the fundamental aspects and functionality of the simple network management protocol (SNMP). The operational code of the SNMP is based on freely available software (joesnm). This paper outlines how joesnm was used to develop a suitable network management GUI, which is used to develop laboratory exercises for undergraduate engineering students. This laboratory, undertaken by the students, in parallel with the theoretical information presented in lectures was a useful aid in the development of the students understanding of network management protocols.

Keywords

computer aided instruction, educational institutions, graphical user interfaces, laboratories, protocols, telecommunication engineering education, telecommunication network management

Disciplines

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Telecommunications Network Management Laboratory

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Topic: ICT & Education KEYWORDS: Network Management, SNMP, Set, Get Trap

This paper discusses network management laboratory design and implementation at the University of Wollongong in the School of Electrical, Computer and Telecommunications Engineering in years of 2002 and 2003 for a final year specialisation subject called Telecommunication Network Management for telecommunications engineering students. The design and implementation included that of a network management GUI incorporating the fundamental aspects and functionality of the Simple Network Management Protocol (SNMP). The operational code of the SNMP is based on freely available software (joesnmp). This paper outlines how joesnmp was used to develop a suitable network management GUI, which is used to develop laboratory exercises for undergraduate engineering students. This laboratory, undertaken by the students, in parallel with the theoretical information presented in lectures was a useful aid in the development of the students understanding of network management protocols.

The main objective was to make SNMP more understandable to engineering students, who were otherwise confused about SNMP, so the laboratory generated hands on experience. The main objectives of the design can be summarised in the following points

1. Educational tool.
2. Design has to be user friendly.
3. Windows based.
4. SNMPv1 and v2.
5. Simple Command buttons.
6. 4 Laboratory sessions of 1 hour length.

There are three main functionality of SNMP and is demonstrated with the development of this educational package, which included:

1. **Get** enables the management station to retrieve the value of objects at the agent.
2. **Set** enables the management station to set the values of the objects at the agent.
3. **Trap** enables an agent to notify the management station of significant events.

The four experiments set up were under the following headings:

1. **Experiment 1:** TINI Board Setup
2. **Experiment 2:** TINI Board Agent
3. **Experiment 3:** Exploring the GET and SET function of SNMP
4. **Experiment 4:** The TRAP function. The main GUI is shown in Figure 1. The main functions are the GET, SET, GETNEXT functions. Figure 2 depict the TRAP functionality of this GUI. In the completed paper details are presented into the development of this education tool. An example is shown under the heading of Management Information Tree (MIB).

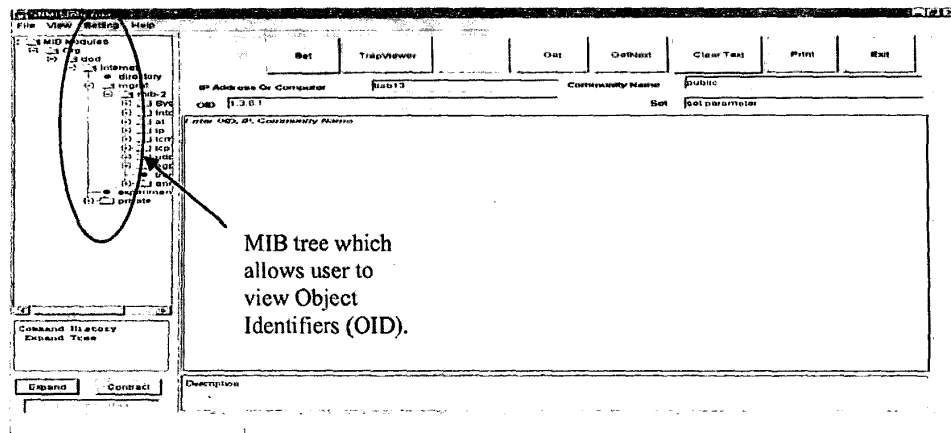


Figure 1 depicts the main GUI used by undergraduate students in the network management lab.

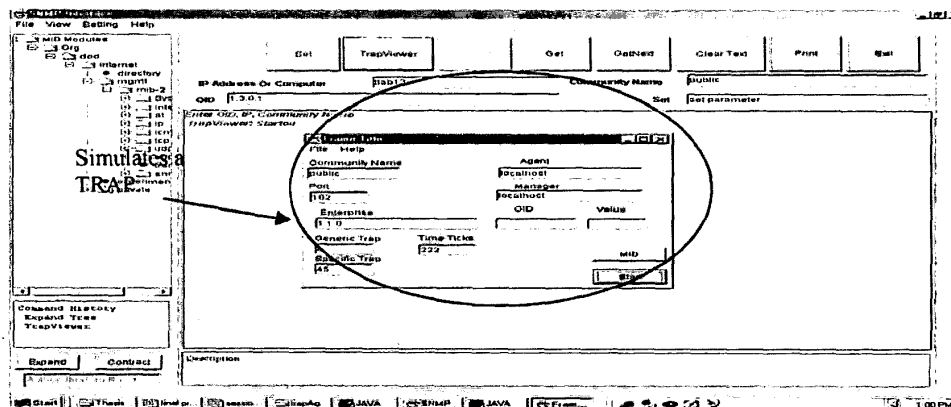


Figure 2 depicts the TRAP function of SNMP being demonstrated.

The Management Information Tree (MIB)

The MIB tree is located on the left panel of the management station interface. It holds the tree nodes, which hold key data about a managed object. These managed objects can be routers, bridges or personal computers on a local area network (LAN).

This MIB tree is developed using the tree method in the JAVA programming language. An example is shown below.

```
private void createNodes(DefaultMutableTreeNode top) {
    DefaultMutableTreeNode Org = null;
    DefaultMutableTreeNode dod = null;
    DefaultMutableTreeNode internet = null;
    Org = new DefaultMutableTreeNode(new ipdesname(".1.3", "original node", "Org", "")); top.add(Org);
    dod = new DefaultMutableTreeNode(new ipdesname(".1.3.6", "depart. Of def.", "dod", ""));
    Org.add(dod);
}
```