Network Management Education: My Views

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My Background

- **Senior Researcher and Lecturer (Assistant Professor) in the Computer Science Dept., UCL, 1990-1997**
  - Introduced MSc course on Network and Services Management (NSM) since 1992-93

- **Professor in the Dept. of Electronic Engineering, University of Surrey, 1998-2007**
  - Developed further the above MSc course, updating the syllabus and introducing new areas as they were emerging

- **Professor in the Dept. of Electronic and Electrical Engineering, University of Surrey, since January 2008**
  - Continue teaching the above Network and Services Management MSc course

Other Related Teaching

◆ **I have also been teaching Telecommunication Networks (synchronous transmission, SS#7) emphasising relevant management needs**

  ● **Relevant examples used in the NSM course**

◆ **I also have also been teaching Advanced Data Networks (IGP/BGP routing, MPLS)**

  ● **Essential background for the Traffic Engineering aspects of the NSM course**

◆ **I also teach Advanced Object-Oriented Programming**

  ● **Important background for the NSM lab assignment**

My NSM Current Course Content

◆ **Introduction to network/service management**

◆ **Manager-agent model. Open Distributed Processing model.**

◆ **Examination, comparison and examples of:**
  - **Internet SNMP, OSI Systems Management, OMG CORBA**

◆ **Hierarchical management, the TMN model**

◆ **Service and network management relationship**
  - **Service impact on the network, monitoring, provisioning**

◆ **IP Network configuration**
  - **Intra-domain Traffic Engineering (MPLS and OSPF configuration)**
  - **Inter-domain Traffic Engineering (BGP configuration)**

◆ **Quality of Service Management**
  - **Intra- and inter-domain example architectures and approaches**

NSM Lab Assignment

◆ **Lab-based programming assignment in Java using AdventNet SNMP and JDK CORBA**

◆ **Students build a series of monitoring programs**
- **Retrieve a SNMP table with dynamic entries (TCP connections), then optimise this retrieval**
- **Periodically retrieve a byte counter (ifInOctets, ifOutOctets) and produce a bandwidth rate through a moving average algorithm**
- **Wrap this up as a CORBA object and instantiate a numbers of these remotely through a factory (using also the name server)**
- **Assign a threshold to the bandwidth rate and trigger an event when crossed upwards that is received by a manager object**

◆ **They learn a lot and assimilate the theory**

◆ **Those who cannot program well do an essay-based assignment**
- **This year they are looking critically at Web Services**

Other NSM Content

◆ **In the past there was material on integrated network/ service management and control architectures**

  - **TINA, OSA**

◆ **Another version that is offered to BT employees has much more service management material**

  - **TMF eTOM, ITIL, NGOSS, etc.**

◆ **Need to bring some of this into the academic NSM module but this stuff is difficult to examine**

  - **Cannot easily reason about, not academic enough**

NSM Teaching

◆ **No single book covering relevant material**

◆ **In fact, the existing books address protocols (SNMP, CMIP/TMN), case studies (the 2 IEEE Press books) or are too general for such a course**

◆ **A good book and an agreed curriculum would be of great benefit to the community**

◆ **I have actually recruited many of my PhD students through this module and subsequent MSc projects**

Summary

◆ **My MSc course has been very successful over the years**

- **But students ask for a reference text book**
- **The viewgraphs of my notes are publicly available from my personal Web pages**

◆ **Lack of an agreed course structure and textbook**

- **This could add value to the area**
- **It would also prove that this is a valid scientific area**
- **It would help in attracting more PhD students and be beneficial to the community as a whole**