IBM Service Science, Management, and Engineering
Information Technology Services Curriculum

Cultivating in demand skills for an on demand world

David Graves and Paul Kontogiorgis
Agenda

General Services Overview

- Importance of IT Services

SSME - Information Technology Services Curriculum (SSME-ITSC)

- IT services definition, examples, and economics
- SSME-ITSC Description and Components
- Implementations
- Example curricula
- Value
Importance of IT Services

- In the U.S. alone, 1.5 million additional skilled IT professionals are expected to be needed by 2006

- IT is one of America's fastest growing industries

- Approximately 70 million Baby Boomers will exit the workforce during the next 15 years, with only 40 million workers coming in

- IBM is planning to hire over 50,000 employees in the next 10 years

* Watson Wyatt, Monster.com; U.S. Department of Labor; Bureau of Labor Statistics; Information Technology Association of America
Agenda

General Services Overview

- Definitions
- Worldwide service system
- IBM Services Science, Management, and Engineering (SSME) program

SSME - Information Technology Services Curriculum (SSME-ITSC)

- IT services definition, examples, and economics
- SSME-ITSC Description and Components
- Implementations
- Example curricula
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Information Technology (IT) Service Definition

- An IT service is the advertised and delivered function provided by the execution of repeatable IT operational processes to support business needs.

- IT services can generally be classified as stakeholder or IT element focused:
  - The “user request management” IT service is stakeholder focused eg call centers.
  - The “software distribution” IT service is IT element focused eg data centers.
  - Many cases exist that an IT service may be considered equally in both classes, for example “license management.”
  - Although IT services can be delivered modularly they are often inextricably linked together.
IT Service Examples

- Stakeholder focused service examples
  - Help desk and end user support
  - IT Security policy administration
  - Application development and maintenance
  - User authentication and authorization
  - Service request management
  - Service level attainment
  - Service creation

- IT Element focused service examples
  - Data transfer and translation
  - IT asset change control
  - Device and application availability management
  - Computing infrastructure architecture
  - Operations management
  - Software distribution

- IT Taxonomy Inputs
  - IBM’s PRM-IT
  - ITIL
  - Cobit
  - ISO20000
## IT Services Economics

### IBM jobs posted on 30 November, 2006

<table>
<thead>
<tr>
<th>Location</th>
<th>Openings</th>
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</thead>
<tbody>
<tr>
<td>India</td>
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<tr>
<td>Asia</td>
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<td>Europe</td>
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<tr>
<td>United States</td>
<td>2,461</td>
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</tbody>
</table>

### North America jobs posted at hotjobs.yahoo.com on 30 November, 2006

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Number of Openings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incident management</td>
<td>1,582</td>
</tr>
<tr>
<td>Database administrator</td>
<td>2,443</td>
</tr>
<tr>
<td>IT architect</td>
<td>4,874</td>
</tr>
<tr>
<td>Solution architect</td>
<td>5,753</td>
</tr>
<tr>
<td>Programmer</td>
<td>7,854</td>
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<tr>
<td>Computer operations</td>
<td>20,607</td>
</tr>
<tr>
<td>Problem management</td>
<td>42,468</td>
</tr>
<tr>
<td>IT service management</td>
<td>46,697</td>
</tr>
<tr>
<td>Systems management</td>
<td>79,048</td>
</tr>
</tbody>
</table>
SSME-ITSC Positioning

IBM Services

- Business consulting
- Business transformation

Client Enterprise

- Business services
- Business processes
- IT processes
- IT infrastructure
  - Storage
  - Servers
  - Network
  - Enablement software
  - Business applications

ITSC

- IT Operations
- Application development and maintenance

Graphic by David Graves and Paul Kontogiorgis
IT Services Economics

- **Global IT Services Marketplace***
  - Expected 6% compounded annual growth rate from 2006 to 2008
  - 2008 market should be roughly $762 Billion
  - North America predicted to be $337 Billion, Europe $221 Billion, Asia $44 Billion
  - Eastern Europe was $4.8 Billion in 2004 and should be $6.5 Billion by 2008
  * [http://www.informationweek.com/showArticle.jhtml?articleID=26800067](http://www.informationweek.com/showArticle.jhtml?articleID=26800067)

- **IBM IT Services Organization**
  - 190,000 personnel in 160 countries
  - 2005 service revenue was $47.4 billion
  - Managing for clients
    - 342 data centers comprising over 6 million square feet of raised floor
    - 1100 mainframe servers with 10,000 terabytes of storage
    - 166,000 distributed servers with associated Storage Area Networks
    - 13 million LAN ports, 56,000 routers and switches, 2,400 firewalls
    - 3.5 million end user computers generating 21 million help desk calls per year
SSME-ITSC Components

All courses and degrees may be business or technically oriented

**Bachelor Degree Tracks**

IT Infrastructure Management – Managing IT Elements
IT Service Management – Managing Relationships and Service Quality

**Master and Doctoral Tracks**

IT Services Integration
Business Process Management
Policy Based Autonomic Infrastructures

The post graduate degree tracks represent the frontier of IT Services and offer significant opportunity for contribution and innovation by participating universities and candidates
SSME IT Services Curriculum Program Description

- The SSME Information Technology Services Curriculum (SSME-ITSC) is a specific implementation of SSME where the class of services are those for operating Information Technology

- Designed to establish university courses and degrees that foster in students the in demand skills needed for delivering IT services

- Encompasses education for architecting, engineering, implementing, managing, and delivering IT services

- Creating a global repository of openly available IT service management courses

- Courses are modular in approach for partial, gradual, or whole incorporation into existing computer science, management information systems, or business administration degree programs or for constructing entirely new and innovative degree programs

- Courses and curricula are identified and planned by institution interest and commercial partner skills needs
SSME-ITSC Components

- The ITSC is comprised of approximately 80 IT services topics each capable of being a course, combining to form a course, or combining or expanding into full degree curricula.

- Course lecture presentations and instructor lecture notes are available on the IBM Academic Initiative website for free use following an “open source” philosophy.

- Universities may use and modify existing course material and IBM may provide subject matter expertise to develop additional courses from the topics of interest.

- IBM software is available free of charge via the IBM Academic Initiative website to supplement lecture material providing hands on experience and possible software or industry certifications for students.
SSME-ITSC Components – Services Topics

- IT Systems Architecture
  - Management system architecture
  - Service and component design
  - Service Oriented Architecture
  - Technology governance
  - Architectural methods

- Infrastructure Services
  - IT Services Operations
  - IT management system evaluation
  - Performance Management
  - Server administration
  - Backup and restore
  - Storage
  - Event
  - Availability
  - Capacity
  - Facility
  - Network
  - IT Recovery
  - Security

- Business
  - IT Strategy
  - Service marketing and sales
  - Service requirements management
  - Service creation
  - Service request management
  - Service Level Attainment
  - Client relationships
  - Portfolio management
  - Customer satisfaction management
  - Service pricing and contract administration
  - IT workforce management
  - Service continuity
  - Project management and service deployment
  - Solution globalization and accessibility
  - Data privacy

- Configuration
  - Change
  - Asset
  - Software distribution and license management
  - Electronic inventory

All services topics = 79,048
SSME-ITSC Components – Services Topics

- Service Improvement
  - Incident
  - Problem
  - User contact
  - Product release
  - Risk management
  - Process improvement
  - IT solution test
  - IT service acceptance
  - IT Knowledge Management
  - Capacity Management

- Advanced
  - Service Oriented Architecture
  - Services integration
  - Security
  - Disaster or business recovery and resiliency
  - Data management
  - IT service research
  - IT service reporting
  - IT infrastructure consolidation
  - IT infrastructure virtualization
  - Business process management
  - Policy based autonomic computing

- On demand IT services
  - IT resource metering
  - Consumption based billing
  - Autonomic IT infrastructure

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SSME-ITSC Collaborations

- Missouri State – ITSM bachelor degree cohort beginning spring 2007
- North Carolina State - master degree in network management cohort started autumn 2006
- University of Economics, Faculty of Informatics and Statistics, Prague, Czech Republic - business process management under consideration
- The Ohio State University and Georgia Tech – discussion underway regarding master degree in autonomic computing and ITSM bachelor degree
- Louisiana State University – curriculum planning workshop January 2007, focus is on SOA curriculum and research
- Brno University of Technology, Faculty of Information Technology – winter 2006 IT Services Foundations course; Winter 2006 semester 73 students, 2007 summer semester 104
- University of Colorado at Boulder – IT foundations course
- Korea University – IT foundations course
- Masaryk University, Faculty of Informatics, Brno, Czech Republic - IT foundations course beginning spring 2007
- Dozens of active or prospective institutions in Europe, Asia, and South America
Sample Curriculum Topics – Service Oriented Architecture

Master of Science in Service Oriented Architecture

- Web Services Description Language
- SOA Lifecycle
- SOA Reference Architecture
- SOA Programming Model
- SOA Standards
- BPEL
- ESB
- SOA Adoption & Transformation
- SOA Assessments
- CBM
- SOA Governance
- SOA Tools
- Web Services and XML
- Service Component Architecture
- SOA Security
Sample Curriculum Topics – IT Security Services

Bachelor or Master of Science in IT Security Services

- Internet security
- Ethical hacking
- Secure systems
- Smart cards
- Sensors & vulnerability analysis
- Secure payment systems
- Antivirus
- Privacy technology
- Biometrics
- Multiparty protocols
- Firewall Management
- Physical and Logical Aspects
- Virus Services
- Trust policies
- Cryptographic hardware and software
- Digital watermarking
- XML security
- Intrusion detection and prevention
- Incident management
- Vulnerability scanning and assessment
- Compliance management
- Intelligence
- Email security management
- Forensic analysis
- Security Monitoring
- ID Management
- Risk Management
SSME-ITSC Value

Universities

Aid curricula evolution to reflect the role of services in the IT industry
Attract students to CIS and CS programs by matching outcomes to workforce demands
Universities are shifting to a services orientation – ITSC is a fundamental aspect of services

Students

The IT Services curriculum will prepare students for today’s and future information technology and technically oriented business management job opportunities
Students would be in a position to bring significant and innovative change to IT services
Graduates with ITSC knowledge could obtain several product and industry certifications
Paired with systems management tools, ITSC provides practical hands on experience for greater job prospects

Industry

Accelerated readiness of the workforce will help alleviate skills availability issues
Bridge the communication gap between IT functional jobs and business leader vision
Significantly reduce transitional or “ramp up” costs for college graduates entering the workforce
For More Information

- IBM Academic Initiative  
  www.ibm.com/university
- IBM University Relations  
- SSME home page  
  http://www.research.ibm.com/ssme
- SSME-ITSC home page (under construction)  
  http://www.research.ibm.com/ssme/itsc
- SSME Course Materials  
  http://www.almaden.ibm.com/asr/SSME/coursematerials
- Services Education  
- Course Material References  
- SSME-ITSC contacts  
  David Graves  graves@us.ibm.com  303-395-3765  
  Paul Kontogiorgis  paulkont@us.ibm.com  773-290-2745
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Appendix

David Graves and Paul Kontogiorgis
IBM Academic Initiative Benefits

- Access to leading-edge, open standards-based technology
- Access to world-class curricula and courses
- Ongoing faculty skills development
- Increase in student placement
- Industry-leading certifications
- Students can enroll in Opportunity Data Base
- Potential partnerships with IBM customers and Business Partners
Course Descriptions

- **IT Foundations I and II**

  These courses provide an overview of several IT services to orient the student to systems management. The topics covered include an introduction to the terms and concepts of IT services and introduction of services interconnections. The courses provide information on event, configuration, asset, performance, capacity, problem, change, security, network, storage, and business process management. The course features use cases to reinforce the lecture material. The pre-requisites for this course are an understanding of information technology (IT) devices and categories.

- **Business Process Management**

  Business Process Management provides an overview of the business and technological aspects of managing business processes focused to affect business impact and outcomes. The course will use an architectural method to teach how to determine business impact of IT elements and map IT elements to a customer’s critical business processes. The pre-requisites for this course are an understanding of information technology (IT) devices and categories, and completion of Foundations in IT Services.
Course Descriptions

- IT Asset Management

The Asset Management course will discuss financial and physical IT asset management. Areas of instruction include remote control, electronic inventory and software distribution. Inventory is the service responsible for capturing the software and hardware information for a customer's IT environment. Software Distribution is the service responsible for distributing software to the IT environment including data, patches, or entire applications. Remote control is used for manipulating IT elements remotely. The course will culminate in a case study with specific considerations of asset management interconnections to other IT Services. The pre-requisites for this course are an understanding of information technology (IT) devices and categories, and the Foundations in IT Services course.
IT Services Economics

- IBM US job opportunity research conducted on 16 October, 2006
  - 425 listings for IT specialist and IT architect
  - 1,236 listings in the IBM Global Business Services and IBM Global Technology Services divisions
  - 2285 total job listings, 2,362 on 14 November

- hotjobs.com job openings research conducted on 16 October, 2006
  - 514 with keywords "IT Architect“, 534 14 November
  - 1184 with keywords "solution architect"
  - 917 with keyword "ITIL“, 956 14 November
  - 468 with keywords "problem management“
  - 176 with keywords "incident management“
  - 2722 with keywords "database administrator"
  - 174 with keywords "IT Service Management“, 187 14 November
  - 621 with keywords "computer operations"
  - 3400 with keywords "systems management“

- hotjobs.com listings above trending downward on 14 November from 16 October