Tampere, Finland
13.11. – 14.11.2001

XML in academic education

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XML in academic education

- do we meet ~~industry~~ needs?
student

XML Finland 2001

~~"Surviving the XML (R)evolution"~~

"Riding the wave in Style"

Expectation: XML

- One technical solution for all IT problems
- Steep learning curve
- Applicable to every existing domain and technique
- Unification structure for the web
- "Peacemaker" between the systems
- Fundamental concept in IT education
- ...is the "Semantic Web"

History of Markup Languages

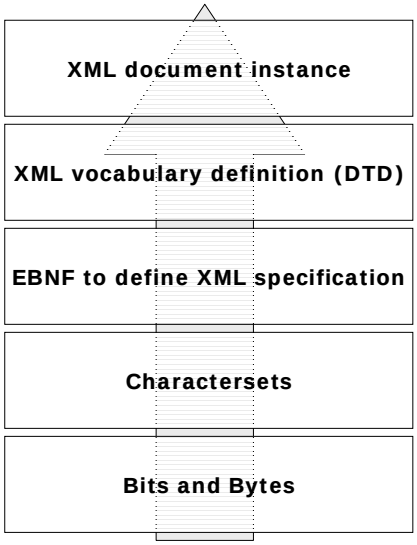
- genCode (GCA, 1967) [Tunnicliffe]
- GML (IBM, 1969) [DCF] [Goldfarb]
- SGML (ISO, 1978/86) [DSSSL] [Goldfarb]
- HTML (CERN, 1989/91) [CSS] [Burners-Lee]
- XML (W3C, 1998) [XSL] [Bosak, Bray, SMcQ]

- HyTime
- Hypercard
- Hyper-G, Hyperwave

What is XML?

"A simple, common layer for tree structures in a character stream."

Where is XML?




```
<Person>
        <FirstName>Bert</FirstName>
        <LastName>Dolan</LastName>
```

```
<!ELEMENT Person
        (FirstName+, LastName,
        DOB, Address+, Phone*)>
```

```
elementdecl ::= '<!ELEMENT' S Name
                S contentspec S? '>'
```

```
01000001 = 'A'
```

```
1
0
01000001
```

Computing Curriculum

- Joint Taskforce on Computing Curricula

IEEE Computing Society

Association for Computing Machines (ACM)

- Steelman Draft, August 2001
- URL: http://www.computer.org/education/cc2001/steelman/cc2001/

Charter

"To review the Joint ACM and IEEE/CS Computing Curricula 1991 and develop a revised and enhanced version for the year 2001 that will match the latest developments of computing technologies in the past decade and endure through the next decade."

- Revise Computing Curricula 1991 so that it incorporates the developments of the past decade
- Split into computer science, computer engineering, software engineering and information systems section

Knowledge Focus Groups

Body of knowledge for computer science at the undergraduate level:

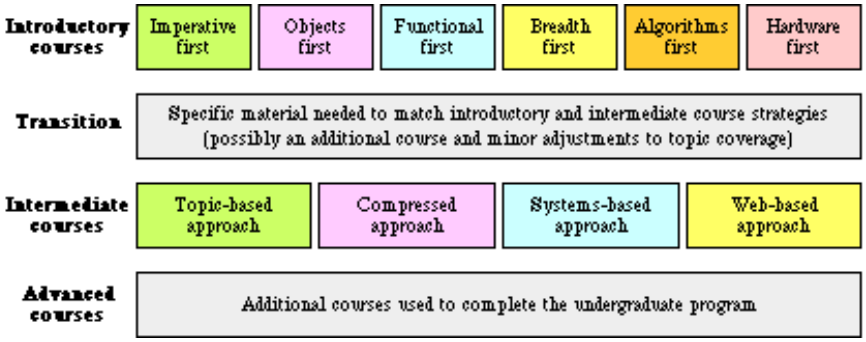
1. Discrete Structures (DS)
2. Programming Fundamentals (PF)
3. Algorithms and Complexity (AL)
4. Programming Languages (PL)
5. Architecture and Organization (AR)
6. Operating Systems (OS)
7. Net-Centric Computing (NC)
8. Human-Computer Interaction (HC)
9. Graphics and Visual Computing (GV)
10. Intelligent Systems (IS)
11. Information Management (IM)
12. Software Engineering (SE)
13. Social and Professional Issues (SP)
14. Computational Science (CN)

Pedagogy Focus Groups

- Consider curricular issues across computer science as a whole (holistic perspective):

1. Introductory topics and courses
2. Supporting topics and courses
3. The computing core
4. Professional practices
5. Advanced study and undergraduate research
6. Computing across the curriculum

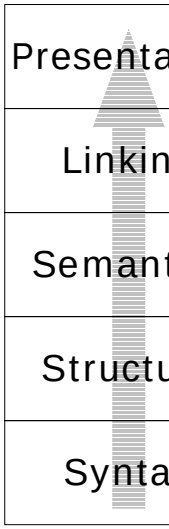
Course levels



Information Management IM)

IM1. Information models and systems (3)
IM2. Database systems (3)
IM3. Data modeling (4)
IM4. Relational databases
IM5. Database query languages
IM6. Relational database design
IM7. Transaction processing
IM8. Distributed databases
IM9. Physical database design
IM10. Data mining
IM11. Information storage and retrieval
IM12. Hypertext and hypermedia
IM13. Multimedia information and systems
IM14. Digital libraries

XML core technologies



CSS, Cascading Style Sheets
XSL, Extensible Stylesheet Language

XLink, XBase
XPointer

Topics Maps
RDF, Resource Description Framework

XML Schema
DTD, Document Type Definition

XML Namespaces
XML 1.0

Teaching XML

- Concepts and ideas behind XML
- Syntax and semantic of core XML technologies
- XML doesn't replace existing technologies, it extends it
- Vision: "What XML can (not) do"
- XML is not only related to textual representations of data

Adaptive Graphics

- Static vs. dynamic part
- Quality changes
- Quantity changes
- Examples:
  - Exhibition, conference maps
  - Entertainment maps
  - Maintenance manuals
  - Online cartoons

COURSE – Applications of XML

Lecture: 24 weeks, 3 hours per week
Tutorial: 20 weeks, 3 hours per week
Additional tasks: two projects, P1 (Christmas) and P2 (Easter), 6-8 assignments (Ax)
one exam

Week	Michaelmas Term **The Basics**	Hilary Term **XML vocabularies**	Trinity Term **Advanced XML**
1	History: **SGML**	**XSLT** (eXtensible Stylesheet Language Transformations)	Electronic Publishing Concepts
2	History: **HTML**	**XSL-FO** (Formatting Objects)	Processing XML: Servlets vs. Data Islands
3	XML Document Structures	XML and Images: **SVG** (Scalable Vector Graphics)	XML Document Management Systems
4	XML **DTD**	XML and Semantics: **XTM** (TopicMaps) and **RDF** (Resource Description Format)	XML Publishing Systems: **Cocoon**
5	XML Schema: **Structures**	XML and Multimedia: **SMIL** (Synchronized Multimedia Integration Language)	Data Exchange with XML: **BizTalk** and **ebXML**
6	XML Schema: **Datatypes**	XML and RMI: **SOAP** (Simple Object Access Protocol)	[...]
7	XML and Java: **SAX** parser	XML and Databases: **MSSQL2000**, **Oracle 9i**	
8	XML and Java: **DOM** parser	XML and Databases: **XQuery**	
9	**XLink**, **XPointer** and **XPath**	[...]	

COURSE – Case based learning

- "Case study approach"
- Teach Computer Science with mainly XML examples
- Use XML as glue between the various course topics

Teaching XML in…

- IT courses
  - Multimedia, Web Technologies, Data modeling, …
- Inter-faculty courses
  - Bio-engineering, Medical Informatics, IT in education, …
- Extra-IT courses
  - Biology, Music, History, Languages
- Continuing Education
- Professional development

XML in academic research

- Core XML research
  - Improvements of existing XML components
  - Interconnection of existing IT and XML technologies
- Development of domain specific models and architectures
  - Advantages-/ disadvantages
- XML as a medium for
  - ...

Example - (Genetics, BioML)

Industry expectations

- Knowledge of core XML technologies
- Data representation
  (XML syntax)
- Data modeling
  (DTD, XML Schema, XML vocabularies)
- Data transformation
  (SAX, DOM, XSL, Java)
- Comparisons with more traditional approaches

Awareness Program: XML

AWARENESS
XML
PROGRAM

Questions & Answers

- deepX Ltd.
  - Data Engineering and Electronic Publishing with XML technologies -
  http: www.deepx.com
  email: ben@deepx.com

- Trinity College Dublin
  - Knowledge and Data Engineering Group, Computer Science Department -
  http: www.cs.tcd.ie/Benjamin.Jung/
  email: jungb@tcd.ie