"Politehnica" University of Timisoara

Advanced Web Programming
C1. Overview

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The Learning Environment

UPT Virtual Campus on http://cv.upt.ro

AWP on Virtual Campus

http://cv.upt.ro

Motivation

- Web is everywhere
  - From personal computers in the home and work place to mobile devices like Tablets or Smartphones
  - 2010-2013: 15-50 billion Web pages (http://www.worldwidewebsize.com/)
- Web programming is a leading research topic
- Web becomes a programming platform

Course goals

- Learn the state of the art in Web programming technologies

- Study some latest development frameworks and tools

- Understand the Web 2.0 and 3.0 philosophy and identify some open research topics

Internet and Web – short history

- 1980 "*World Wide Web*" - Tim Berners-Lee and Robert Cailliau at CERN

- Most of the internet protocols was adopted in early '90 (TCP-IP, FTP, HTTP ...)

- 1992 National Center for Supercomputing Applications – NCSA Mosaic

- 1994 – the WWW consortium (MIT, INRIA, DARPA, EU Commission)

Contents

- Overview, Research Topics
- Basic Web Technologies
- Client Side Scripting
- Server Side Scripting
- Ajax. Web App Frameworks
- Rich Internet Applications
- Web Multimedia Applications. SMIL

Basic Web Technologies

- **Basic Web Technologies**
  - HTML
  - XML
  - XHTML
  - CSS

Client Side Scripting

- Client Side Scripting
  - Scripting languages. JavaScript
  - DOM
  - Client-page interaction

Server Side Scripting

- **Server Side Scripting**
  - PHP. ASP. JSP ...
  - PDFLib
  - PHP WAF
    - <u>Symfony</u>
    - <u>CodeIgniter</u>

Ajax. Web App Frameworks

- Ajax
  - XMLHttpRequest
  - Managing interactions
  - Ajax libraries
- Ajax based Web App Frameworks
  - Dojo Toolkit

Rich Internet Applications

- Rich Internet Applications (RIA)
  - RIA technologies
  - Google APIs (Google Maps API , Google Visualization API , Google Picker API)
  - Web services
  - Web mashups
  - Testing with Windmill

Web multimedia applications

- Web multimedia applications
  - SMIL – Synchronized Multimedia Integration Language
  - SMIL Tools
  - Web CMS: <u>Joomla</u>, <u>Wordpress</u>
  - Scalable Vector Graphics (SVG)

Some Open Research Topics

- Social Web (web 2.0) -> Semantic Web (3.0)
  - *Semantic Web is a group of methods and technologies to allow machines to understand the meaning - or "semantics" - of information on the World Wide Web* (Wikipedia).
  - Semantic Web Data and Ontologies
  - Applications interoperability on the Semantic Web
  - Semantic Web Services
  - Data mining on the Semantic Web
  - Semantic Web performance and scalability issues

More research topics

- New and more powerful standards
  - Resource Description Framework (RDF)
  - Agents Description Language (ex DARPA DAML)
  - Tools to query information (ex. SPARQL)
- Multimedia languages (ex. SMIL)
- Learning environments (ex. Moodle)
- Main conferences: Extended Semantic Web Conference (EWSC), Conference on Web Information Systems and Technologies (WEBIST)

EWSC - Research Track: Ontologies

- Languages, tools, and methodologies for ontology engineering
- Ontology extraction/induction from data and the Web
- Ontology matching, alignment and merging
- Ontology evolution
- Collaborative ontology engineering
- Design patterns for ontologies
- Ontology-based data integration ...

EWSC - Research Track: Reasoning

- Approximate reasoning techniques
- Scalable reasoning
- Reasoning under uncertainty
- Non-deductive approaches to reasoning
- Reasoning on the Web of Data
- Mixing logical and statistical reasoning
- Reasoning with context dependent knowledge
- RDF- and OWL-based reasoning
- Distributed and parallel reasoning…

EWSC - Research Track: Semantic Data Management

- Systems for Semantic Data Management
- Scalable Analysis of the Web of Data
- Query processing of Semantic Data
- Semantic access to Legacy Data
- Management of spatial Data
- Management of dynamic Data & temporal semantics
- Security and privacy
- Ranking Semantic Data …

EWSC - Research Track: Linked Open Data

- Linked Open Data publication
- Linked data and metadata integration/fusion/ consolidation
- Linked data applications (e.g., eGovement, eEnvironment, or eHealth)
- Searching, querying, analyzing, and mining linked data; reasoning with LOD
- Dataset description and discovery
- Architecture and infrastructure
- Provenance, privacy, and rights management...

EWSC - Research Track: Social Web and Web Science

- Bringing user generated content into the Semantic Web

- Semantically-enabled social platforms and applications: wikis, forums, portals, blogs and microblogs, etc.

- Social semantic Web, the Internet of Things and reality augmented by the social semantic web

- Ethical issues related to the use of user generated content ...

EWSC - Research Track: Nat. Lang. Proc. and Info. Retrieval

- Semantic annotation and tagging exploiting linked data
- Semantic search, semantic indexing and question answering
- Standards for meaning representation
- Ontology-based information extraction
- Natural Language Search and Question Answering over linked data
- Web-based creation of lexical resources
- Language processing of social networks ...

EWSC - RT: Mobile Web, Sensor and Semantic Streams

- Architectures and middleware for the semantic streams

- Context- and location-aware applications based on semantic technologies

- Intelligent data processing and large sensor and mobile web data analytics

- Ontologies and rules for streams

- Semantic data on the sensor and mobile web

- Scalability and performance of semantic technologies on sensor and mobile web …

EWSC - Research Track: Machine Learning

- Statistical machine learning in Linked Data
- Inductive methods for ontology construction
- Machine learning for ontology matching, instance matching, search and retrieval
- Link prediction and recommendation engines
- Approximate inductive reasoning on ontologies
- Data mining and knowledge discovery in Linked data and ontologies
- Ontology mining …

EWSC - RT: Services, Processes, Cloud Computing

- Semantic description of services and processes
- Trusted, privacy preserving and secure semantic cloud services and processes
- Semantic service discovery, selection and composition
- Semantic service interoperability
- Semantics for service negotiation
- Scalable automation of the service life cycle
- Case studies of semantic business service applications …

WEBIST Topic: Internet Technology

- XML and data management
- System Integration
- Web Services and Web Engineering
- Distributed and Parallel Applications
- Protocols and Standards
- Authentication and Access Control
- Web Security and Privacy
- Web Programming

WEBIST Topic: Web Interfaces and Applications

- Searching and Browsing
- User Modeling
- Personalized Web Sites and Services
- Multimedia and User interfaces
- Metadata and Metamodeling
- Web Geographical Information Systems
- Ontology and the Semantic Web
- Big Data for Internet-based services
- RESTful Web services

WEBIST Topic: Society, e-Business and e-Government

- Knowledge Management
- e-Business and e-Commerce
- Communities of interest
- e-Government
- Social Networks and Organizational Culture
- e-Payment
- Web 2.0 and Social Networking Controls
- Social and Legal Issues
- Social Media Analytics

WEBIST Topic: Web Intelligence

- Learning User Profiles
- Web Information Filtering and Retrieval
- Meta-Knowledge Discovery and Representation
- Privacy and Confidentiality
- Text mining
- Collective Intelligence
- Recommendation Systems
- Web of Things
- Opinion mining and sentiment analysis

WEBIST Topic: Mobile Information Systems

- Mobile Navigation and Assistance
- Context Awareness, Context Detection
- Mobile Social Network Interaction
- Mobile Media Sharing Systems
- Context Aware Media Tagging
- Mobile learning
- Mobile commerce
- Mobile cloud
- Mobile APIs and services

Some Recent PhD Topics

- University of Southampton (2013):
  - How Web Technologies Transform our Privacy
  - Theoretical basis for Interpreting the global Social Web
  - Making Web 2.0 feedback more useful
  - Systems Approach to Cybercrime

References - surveys

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