Syllabus

Description:

Presents software engineering, programming techniques, platforms and tools necessary for rapid development of scalable applications including: cloud platforms; scalable data storage solutions; web applications development environments. The course will provide a general overview of such techniques but will concentrate on selected ones in each term. The students will work in small teams and must develop scalable prototypes during the course.

Expected outcomes:

- Understand the pros and cons of rapid application development (RAD)
- Understand various strategies for rapid application development (e.g. Agile, Extreme, Joint, Lean, Scrum, Spiral)
- Understand the role of scalability in RAD and available solutions (e.g. cloud solutions from Google, Amazon, Microsoft)
- Understand the advantages and disadvantages of using platform independent data storage techniques (e.g. Java Data Objects, Java Persistence API) and platform dependent data storage techniques (e.g. Google Datastore)
- Proficiently use of client side programming (e.g. CSS, HTML, JavaScript, AngularJS).
- Proficiently use the Java programming language within the strategies for RAD.
- Create a rapid prototype for the user interface of an IT application
- Work within a team to develop a prototype for an IT application

Prerequisites:

IT 206, IT 213, IT 214

Schedule Spring 2015:

The weekly session will combine practical skills, analytical skills and theoretical knowledge through creative team working. We will cover theoretical concepts, available tools and methods and project guidance and development. Also, you will have readings, independent and team system development.

The following is a sample list of topics but their organization per weeks may vary. However, based on the specific project(s) selected the topics and their order may vary. New topics may be added. Some topics may be just briefly presented.

A detailed description for each week will be published in the weekly folder. At the beginning of the course the focus will be more on the theoretical aspects and toward the end will shift to the project finalization.

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	THEORY	TOOLS AND METHODS	PROJECT
1	Rapid Application Development Methods	Project Management Tools (code and documentation) Google App Engine (GAE) overview	Topic discussion; Team forming; Setup of development platform
2	Requirements Planning; User centric design	Interaction design tools Interface design tools; GAE applications	Initial project planning for 2 phases; Detailed Design for phase 1 (interaction and interface);
3	Rapid development of web applications – client side	Google Web Toolkit (GWT) Overview GWT Designer Overview	Client demo design and implementation
4	Rapid development of web applications – server side	Java Servlets Overview	Server demo design and implementation
5	Application life-cycle	GAE applications life-cycle	Interaction demonstration
6	Session life cycle	GAE Datastore; Objectify;	Design; Data Model
7	Distributed Data Storage	Building a data model	Server implementation
8	High Replication Storage	Java Data Objects (JDO)	Services implementation
9	Storage Cost	GAE native data store; SQL options	Client implementation
10	Application portability	Amazon, Windows clouds	Minimal interaction prototype
11	Application security	Encryption; Input validation;	Improve functionality
12	User privacy	Test units	Enhancing user interaction
13	Application testing		Final testing
14	Application deployment; Versioning		Final deployment
15			Final Report; Public Presentation;

Additional special topics might be addressed during the course, including: distributed computing with large data sets (e.g. Hadoop MapReduce), data interchange formats (e.g. JSON), data modeling formats (e.g. OWL, RDF).

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Online Textbooks and Documentation:

1. Google App Engine Java and GWT Application Development, By: Daniel Guermeur; Amy Unruh, Publisher: Packt Publishing, Print ISBN-13: 978-1-84969-044-7; Available online for free at: http://proquest.safaribooksonline.com/book/web-applications-and-services/9781849690447
2. Essential App Engine: Building High-Performance Java Apps with Google App Engine; By: Adriaan de Jonge; Publisher: Addison-Wesley Professional; Pub. Date: October 19, 2011; Print ISBN-10: 0-321-74263-X; Print ISBN-13: 978-0-321-74263-6; Web ISBN-10: 0-13-248479-X; Web ISBN-13: 978-0-13-248479-4; Pages in Print Edition: 352; Available online for free at: http://proquest.safaribooksonline.com/book/web-applications-and-services/9780132484794?bookview=overview
3. Lean Architecture for Agile Software Development; By: James Coplien; Gertrud Bjørnvig; Publisher: John Wiley & Sons; Pub. Date: August 16, 2010; Print ISBN: 978-0-470-68420-7; Web ISBN: 0-470684-20-8; Pages in Print Edition: 376; Available online for free at: http://proquest.safaribooksonline.com/book/software-engineering-and-development/agile-development/9780470684207
4. Instructor course notes (they include a detailed tutorial for the project example with explanations)
5. Google App Engine Tutorials and Documentation (https://developers.google.com/appengine/)
6. Google Web Toolkit (https://developers.google.com/web-toolkit/)
7. GWT Designer User Guide (https://developers.google.com/web-toolkit/tools/gwtdesigner/)
8. JDO Documentation (http://db.apache.org/jdo/index.html)
9. JDO Tutorial (http://db.apache.org/ojb/docu/tutorials/jdo-tutorial.html)
10. AngularJS Tutorials (http://campus.codeschool.com/courses/shaping-up-with-angular-js/intro; and https://docs.angularjs.org/tutorial)

Grading:

The students will be assigned a grade as follow:

- Weekly assignments (20%)
- Project interaction demonstration – week 5 (10% presentation; 10% code and demo)
  - The presentation is a public description of the project in class
  - The demo consists of a successfully deployed application and the source code associated
- Project minimal interaction prototype – week 10 (10% presentation; 10% code and demo)
- Final project delivery – week 15 (15% presentation; 15% code and demo; 10% report)
  - The final report must be a team paper
  - At the end of the report each student must specify her or his detailed contributions to the project.

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The grading scale for this course is:

Numeric Grade	Letter Grade
97 – 100%	A+
93 – 96%	A
90 – 92%	A-
87 – 89%	B+
83 – 86%	B
80 – 82%	B-
77 – 79%	C+
73 – 76%	C
70 – 72%	C-
60 – 69%	D
0 – 59%	F

Hardware and Software requirements

For **all sections** you must have a personal computer with internet connection.

For the **online section** you must have a personal computer with internet connection, with speakers and microphone. The course delivery was tested on Windows 7, but it will probably work on other operating systems as well.

You will use different software packages during this class. You will receive installation requirements at the beginning of that week. However, you must try to perform the required operations as soon as possible in order to have the time to correct any potential technical problem that you might encounter.

Course Delivery Methods

The course will be delivered using various methods. You must have your MASON email account activated and you must check your email daily for announcements related to the course. You must have access to Blackboard Learning System and to know how to use its features.

There are video presentations posted on the Blackboard. You must have an environment in which you can watch these videos.

You will have several assignments and assessments to be performed each week. A summary of weekly requirements will be sent at the beginning of the week.

Exams

There are weekly discussions and presentations and there is a final presentation of the project that will be required to be in class.

Intellectual Property

There is a strong recommendation that all work in the class projects to be done based on an open source license (e.g. Academic Free License http://en.wikipedia.org/wiki/Academic_Free_License). This will allow a rich, shared exchange of ideas and will allow each member of the class to further benefit with no restriction from the work performed in the class.

If you want another license for the materials prepared for the class or if you want to keep the entire intellectual property of your contributions you must clearly inform so at the beginning of the class and do a collaboration contract with the other members of the team you belong to. More details will be offered in class.

Privacy

Instructors respect and protect the privacy of information related to individual students. Specific issues relating to an individual student will be discussed via email, telephone or in person. Instructors will not discuss issues relating to an individual student with other students (or anyone without a need to know) without prior permission of the student. There is no guarantee related to the security of email and telephone conversations.

Assessable work other than final exams will be returned to individual students directly by the Instructor (or by a faculty or staff member or a Teaching Assistant designated by the Instructor, or via another secure method). Under no circumstances will a student's graded work be returned to another student.

Faculty and staff will take care to protect the privacy of each student's scores and grades.

Because of the nature of this class, some work performed by the student will be published and discussed in the class. Other students will be able to make comments and suggestions related to the published work, without seeing the actual grade the student earned for the work.

Disability Accommodations

The Office of Disability Services (ODS) works with disabled students to arrange for appropriate accommodations to ensure equal access to university services. Any student with a disability of any kind is strongly encouraged to register with ODS as soon as possible and take advantage of the services offered.

Accommodations for disabled students **must** be made in advance – ODS cannot assist students retroactively, and at least one week's notice is required for special accommodations related to exams. Any student who needs accommodation should contact the Instructor during the first week of the semester so the sufficient time is allowed to make arrangements.

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Honor Code

All members of the Mason community are expected to uphold the principles of scholarly ethics. Similarly, graduating students are bound by the ethical requirements of the professional communities they join. The ethics requirements for some of the communities relevant to Applied IT graduates are available via the following links:

- ACM Code of Ethics and Professional Conduct
- IEEE Code of Ethics
- EC-Council Code of Ethics

On admission to Mason, students agree to comply with the requirements of the Mason Honor System and Code[1]. The Honor Code will be strictly enforced in this course. Honor Code cases are heard by a panel consisting of students – students who meet the requirements are encouraged to nominate themselves to serve on the Honor Committee.

Any use of the words or ideas of another person(s), without explicit attribution that clearly identifies the material used and its source in an appropriate manner, is **plagiarism** and will not be tolerated. There is a "zero tolerance" policy for plagiarism within The Volgenau School. The Instructor reserves the right to use manual and/or automated means (including such services as Turnitin.com) to detect plagiarism in any work submitted by students for this course, and to direct Teaching Assistants and/or other faculty and/or staff members to do likewise in support of this course.

For this course, the following requirements are specified:

- All assessable work is to be prepared by the individual student, unless the Instructor explicitly directs otherwise.
- All work must be newly created by the individual student for this course for this semester. Any usage of work developed for another course, or for this course in a prior semester, is strictly prohibited without prior approval from the instructor.
- For team work a summary at the end of the submission must identify mutually agreed individual contributions.

Students may seek assistance with assigned work (and are encouraged to do so if they feel the need), **provided**:

- The directions for the assigned work do not prohibit such assistance.
- Such assistance is acknowledged in the submitted work, clearly identifying the person(s) giving assistance and the nature of the assistance given.

[1] Available at http://catalog.gmu.edu/ and related Mason Web pages.

- Any work to be submitted is prepared entirely an exclusively by the student submitting it. Students are expressly prohibited from sharing any assessable work for this course in any manner with other students (except students assigned as Teaching Assistants or Undergraduate Peer Mentors to this course and the student's section), unless all students involved have had their work graded and returned by the Instructor, or the Instructor has explicitly approved such sharing.

Note: This syllabus contains fragments from general templates provided by the university and fragments extracted from Dr. Ioulia Rytikova template syllabus.

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