FRUCT Laboratory at PetrSU: Organization and Results

Anatoly V. Voronin, Sergey I. Balandin, Yury A. Bogoyavlenskiy, Kirill A. Kulakov, Dmitry G. Korzun, Anton I. Shabaev

Petrozavodsk State University
Department of Computer Science

Maemo 2 conference, March 25, 2010
Roadmap

1. Software Engineering
2. Open Platforms
3. Maemo and Mobile Development
4. Conclusions
SE Education at PetrSU

**Basic educational lines** at Faculty of Mathematics
* Applied Mathematics and Computer Science (1993)
* Information Systems (2001)

**Curriculum**
* Specialist (5 years), Bachelor+Master (4+2 years)
* University of Helsinki: Common Core of Working Study Program (since 2001)
* FRUCT program: Mobile Programming (since 2008)

**Student team projects:** Initial (2003–2004)
* Scientific-centric project *Web-SynDic*, http://websyndic.cs.karelia.ru/
* Joint project *DaCoPan* (with University of Helsinki), http://dacopan.cs.karelia.ru/
The Base Scheme of SE Education

Introduction: at school, then 1st&2nd year students
- Linux environment, open source
- SE elements in basic IT courses
- Specialization areas and optional courses
- PetrSU Programmer Club

Basics: 3rd year students
- Mandatory course Software Engineering
- Autumn semester: theory + miniprojects
- Spring semester: team projects close to real life

Opening a door to real-life projects: BSc, Diploma and MSc thesis
- Participation in research & development
- PetrSU IT Park
- Regional Center of Information Technology
Regular Student SE Projects (since 2003/04), Spring

**Teams** of 3–6 developers (students)
- Rules of the play
- Manager (a student)
- 15 (wo)man-hours per week, 15 weeks

**Customer**
- Faculty, IT park, Industry
- Software requirements
- Attestation

**Instructor**
- Balancing: education and product
- Progress monitoring, advising, and controlling
- Grading
Open Platforms

Kirill Kulakov
FRUCT Laboratory at PetrSU
25.03.2010
PetruS and FRUCT Program

- Russian Community *Open platforms for mobile devices*
- Maemo programming
- Smart Spaces
- Symbian programming

**University specifics**
- Developing study resources
- Training: Aug. 2008 (PetruS), Feb. 2009 (PetruS),
  Apr. 2009 (FRUCT5, SUAI), Sep. 2009 (Nizhniy Novgorod),
  Feb. 2010 (PetruS)
- Running close-to-real SE projects
- Focusing on R&D issues
- Incubating developers and experts for industry-level projects
  (e.g., at PetruS IT park)

Kirill Kulakov
FRUCT Laboratory at PetruS
25.03.2010
Russian Community *Open platforms for mobile devices*

Content synergy: Education + SE projects
- The All-Russian forum for developers
- Ideas, experience, and software from everyone
- Study materials and tech. docs
- Support for SE projects

http://oss.fruct.org
Maemo programming

Intensive courses (1...6 days)

- Summer school, Aug. 2008 (PetrSU)
- Winter school, Feb. 2009 (PetrSU)
- Training Apr. 2009 (FRUCT5, SUAI)
- Sep. 2009 (Nizhniy Novgorod)
- Feb. 2010 (PetrSU, Qt)

Computational environment:

- Terminal server with SDK
- Web-server to access study materials (Moodle)
- SVN, Mercurial, Git for project repositories
- Wiki for students/developers
## Modifications to the Curriculum

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>First year</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Introduction to C programming</td>
</tr>
<tr>
<td></td>
<td>Introduction to Shell</td>
</tr>
<tr>
<td>2</td>
<td>C++ and Data Structures</td>
</tr>
<tr>
<td></td>
<td>IA-32 Architecture with GAS Assembler Elements</td>
</tr>
<tr>
<td></td>
<td>User Interface Design with GTK/Qt</td>
</tr>
<tr>
<td>Second year</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Computer Networks</td>
</tr>
<tr>
<td></td>
<td>UNIX Programming</td>
</tr>
<tr>
<td></td>
<td>Introduction to Java Programming</td>
</tr>
<tr>
<td>4</td>
<td>Operating Systems</td>
</tr>
<tr>
<td></td>
<td>Maemo Programming</td>
</tr>
<tr>
<td>Third year</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Software Engineering</td>
</tr>
<tr>
<td></td>
<td>Symbian Programming</td>
</tr>
</tbody>
</table>
Extending regular student SE projects (FRUCT)

Organization

- Instructor integrates some manager functions
- Mixed teams: 1st – 6th year students
- 18–20 (wo)man-hours per week (15 for regular projects)
- Possibility of personal study plans for students
- Regular all-project seminars

Student mastering phases

- Autumn semester (3rd year): a miniproject
- Spring semester (3rd year): students are included into ongoing projects (or new projects appear)
- Summer (Jul&Aug): Labs at IT-park, continuation of the project, a demo-prototype is produced
- Autumn/Spring: 4th year students test and debug, project publication
Ongoing Maemo SE Projects: First Wave

- **MySocials**: A Maemo Client for VKontakte Social Network
  wiki: [http://oss.fruct.org/wiki/Maemo-VKontakte](http://oss.fruct.org/wiki/Maemo-VKontakte)
  source code: [http://gitorious.org/mysocials](http://gitorious.org/mysocials)

- **Kimi**: A Personal Organizer in the Internet Event Space
  wiki: [http://oss.fruct.org/wiki/Maemo-Google](http://oss.fruct.org/wiki/Maemo-Google)
  source code: [http://gitorious.org/kimi](http://gitorious.org/kimi)

- **Scribo**: A Maemo Client for LiveJournal
  wiki: [http://oss.fruct.org/wiki/Maemo-Blogs](http://oss.fruct.org/wiki/Maemo-Blogs)
  source code: [http://gitorious.org/scribo-client](http://gitorious.org/scribo-client)

- **MobileTrade**: A Maemo Client for Web Services of Trading/Auction Business Systems
  wiki: [http://oss.fruct.org/wiki/Maemo-Business](http://oss.fruct.org/wiki/Maemo-Business)
  source code: [http://gitorious.org/mobile-trade](http://gitorious.org/mobile-trade)

Bugzilla: [http://oss.fruct.org/bugzilla/](http://oss.fruct.org/bugzilla/)
Iterations

**Iteration 0:** Aug.-Dec. 2008, Summer school, Autumn semester
What is maemo?

**Iteration I:** Feb.-May. 2009, Spring semester, 5th FRUCT Seminar
Test implementation of the ideas

**Iteration II.A:** Jul/Aug. 2009, Summer Labs at IT-Park
Architecture and scenario engineering
Demo prototypes for Maemo 4 and Nokia N8xx

**Iteration II.B:** Sep.-Dec. 2009, Autumn semester, 6th FRUCT Seminar
Testing and debugging

**Iteration III:** 2010, Spring and Autumn semesters
Project experimentation and publication
Moving to Maemo 5, prepare to Maemo 6
Ongoing Maemo SE Projects: Second Wave

- **MySocials-Testing**: All-round Testing of MySocials Project

- **Scribo-Testing**: All-round Testing of Scribo Project

- **M3-Weather**: A Weather Client for Smart-M3 Platform
  wiki: [http://oss.fruct.org/wiki/M3-Weather](http://oss.fruct.org/wiki/M3-Weather)

- **Sensors**: An Application for Using Sensors in Funny Drawing
Research project on Smart-M3 platform development

SmartSlog: PetrSU ANSI C Library Generator for Smart Space Ontology
http://sourceforge.net/projects/smartslog/

- Mapping an OWL ontology description to ANSI C code (ontology library)
- API for programming Smart-M3 agents
  - knowledge processors, KP
  - in high-level terms of ontology entities
  - instead of low-level triplet-based terms
- The Smart-M3 platform is being developed by
  - Artemis JU programme in Sofia (smart objects for intelligent applications)
  - Finnish national DIEM (Device interoperability ecosystem) research projects
Features

- Unification of similar parts in projects
- Weekly interproject seminars
- Use case scenarios in designing
- Local data storage (SQLite or RDF)
- Coding style
  - a variant of K&R for C/C++
  - Doxygen for self-documented code
- Using different technologies and languages (Qt, GTK, Python, SQLite, RDF)
- Automated system testing
  - based on use case scenarios
  - calls to GUI is replaced with testing code (predefined scenarios and checks)
  - each test includes several checks
- GUI checklist
- Valgrind for analyse resource consumption
Feedback to developers community

- Our projects actively use many incoming (hot) technologies
- Send feedback to bugzilla, forums, mailing lists.

Latest feedbacks

- Memory leaks in PySide
- Proxy support in Qt
- SOAP support in Qt
- Support json project
- Deleted packages on maemo.org
Conclusion

- Maemo education
  Maemo 5, Maemo 6, ...
- Open source SE projects
- Smart Spaces,
  the Smart-M3 platform
- Symbian education

http://oss.fruct.org
http://wiki.fruct.org