Programming for Open Platforms at Universities: Experience of Joint Activity of Petrozavodsk State University and Nokia University Cooperation Program

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6th FRUCT Seminar, November 3–6, 2009
Roadmap

1. Software Engineering
2. Open Platforms
3. Maemo Competence
4. Conclusions
SE Education at PetrSU

Basic educational lines at Faculty of Mathematics
- Information Systems (2001)

Curriculum
- Specialist (5 years), Bachelor+Master (4+2 years)
- University of Helsinki: Common Core of Working Study Program (since 2001)

- 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
- 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
- PetrSU IT Park
- Regional Center of Information Technology
Student SE Projects (since 2003/04), spring semester

**Teams** of 4–6 developers (students)
- Rules of the play
- Manager (a student)
- 8–10 (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
PetrSU and Nokia University Cooperation Program

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

**University specifics**

- Developing study resources
- Running close-to-real SE projects
- Focusing on R&D issues
- Incubating developers and experts for industry-level projects (e.g., at PetrSU IT park)
Russian Community *Open platforms for mobile devices*
http://maemo.cs.karelia.ru

**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

? Russian Mobile VAS Awards 2009: Sect. 7 *Community and content for users*

**Basic technologies**
- Wordpress
- PhpBB
- MediaWiki
- Moodle

**Metrics**
- base catalogue of virtual host: 8875 MiB
- Images in MediaWiki: 33 MiB
- Data base: 168 MiB
- Whole system (virtual machine maemo-web): 20761 MiB
Study Course on Maemo programming

Intensive courses (1...6 days)

Semester course:

- Summer school, Aug. 2008 (PetrSU)
- Winter school, Feb. 2009 (PetrSU)
- Training Apr. 2009 (FRUCT5, SUAI)
- Sep. 2009 (Nizhniy Novgorod)
- Spring 2009/10 (PetrSU, 3rd year students)

Computational environment:

- Terminal server with SDK
- Web-server to access study materials (Moodle)
- SVN and Mercurial for project repositories
- Wiki for students/developers

Content synergy: Education + SE projects
## Modifications to the Curriculum

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First year</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Introduction to C programming</td>
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<tr>
<td></td>
<td>Introduction to Shell</td>
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<tr>
<td>2</td>
<td>C++ and Data Structures</td>
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<td></td>
<td>IA-32 Architecture with GAS Assembler Elements</td>
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<td></td>
<td>User Interface Design with GTK/Qt</td>
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<tr>
<td><strong>Second year</strong></td>
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<tr>
<td>3</td>
<td>Computer Networks</td>
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<td></td>
<td>UNIX Programming</td>
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<tr>
<td></td>
<td>Introduction to Java Programming</td>
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<td>4</td>
<td>Operating Systems</td>
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<tr>
<td></td>
<td>Maemo Programming</td>
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<tr>
<td><strong>Third year</strong></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

Organization
- Instructor integrates some manager functions
- Mixed teams: 1st – 6th year students
- 16–18 (wo)man-hours per week (8–10 for regular projects)
- 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, publishing the project
Ongoing Projects: Clients to Social Networks

- **MySocials**: A Maemo Client for Social Networks with Cross-Profile Features
- **Kimi**: A Personal Organizer in the Internet Event Space
- **Scribo**: Multi-service Blogging Application for the Maemo

**Social Internetworking**

- Social Net
- Cross-blog postings: “Scribo”
- Cross-using user profiles: “MySocials”
- Blog
- Social Events
- Cross-using event & contact data: “Kimi”
- Contact list

**Russian Mobile VAS Awards 2009: Sect. 8 Usability**
Ongoing Maemo SE Projects: Mobile Trade

A Maemo Client for Web Services of a Trading Business System

Trading Scenarios
- PRE-selling and VAN-selling
- Sellers and customers are closer
- Network can be temporarily unavailable
- No papers, no intermediate notes, less errors
- No hand overload, no a special workplace
- Less delay in data transfer to CBD
- ...

Trading Business System
- CBD
- Web service

Internet

Bob sells or buys goods
- Viewing available goods
- Making sell agreements
- Offering own goods

Trade agent is outside his office; he is at the customer side
- Making orders for goods
- Checking goods availability
- Viewing business reports

Russian Mobile VAS Awards 2009:
Sect. 2 Application for a mobile device
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, debugging, and moving to Maemo 5

Iteration III: 2010, Spring and Autumn semesters
Maemo 6, Deployment?
Features

- Unification of similar parts in projects
- Weekly interproject seminars
- Usecase scenarios in designing
- Local data storage (SQLite or RDF)
- Coding style
  - a variant of K&R for C/C++
  - Doxygen for self-documented code
- Automated system testing
  - based on usecase scenarios
  - calls to GUI is replaced with testing code (predefined scenarios and checks)
  - each test includes several checks
- GUI checklist
- We are starting to work with Maemo 5 and Qt, ready to Maemo 6

(September 2009)

<table>
<thead>
<tr>
<th>Metrics</th>
<th>Project</th>
<th>My-Socials</th>
<th>Kimi</th>
<th>Scribo</th>
<th>Mobile Trade</th>
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<tr>
<td>LOC: total / comments</td>
<td>ANSI C: 10913 / 3081</td>
<td>ANSI C: 5746 / 1141</td>
<td>ANSI C: 11140 / 3273</td>
<td>C++: 4625 / 1435</td>
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<tr>
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<td>13 / 73 / 282</td>
<td>8 / 79 / 189</td>
<td>10 / 27 / 47</td>
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<tr>
<td>(wo)man-hours: total / persons / average</td>
<td>691 / 5 / 138</td>
<td>555 / 3 / 185</td>
<td>778 / 4 / 195</td>
<td>969 / 4 / 194</td>
<td></td>
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Future . . .

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