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

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Roadmap

1 Software Engineering

2 Open Platforms

3 Maemo Competence

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)
- ACM Computing Curricula (1991, 2001, 2005)
- University of Helsinki: Common Core of
  Working Study Program (since 2001)

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
- 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
- Training: Aug.2008 (PetrSU), Feb. 2009 (PetrSU),
  Apr. 2009 (FRUCT5, SUAI), Sep. 2009 (Nizhniy Novgorod)
- 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*

Математический факультет
Кафедра Информатики и математического обеспечения

Nokia, NSN
FRUCT

Новости, вики разработчика, учебные ресурсы, форум
Maemo, Symbian, ...

Студенты, начинающие разработчики

Кросс-платформенные приложения

Basic technologies	Metrics

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

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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

Semester	Course
	First year
1	Introduction to C programming
	Introduction to Shell
2	C++ and Data Structures
	IA-32 Architecture with GAS Assembler Elements
	User Interface Design with GTK/Qt
	Second year
3	Computer Networks
	UNIX Programming
	Introduction to Java Programming
4	Operating Systems
	Maemo Programming
	Third year
5	Software Engineering
	Symbian Programming

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
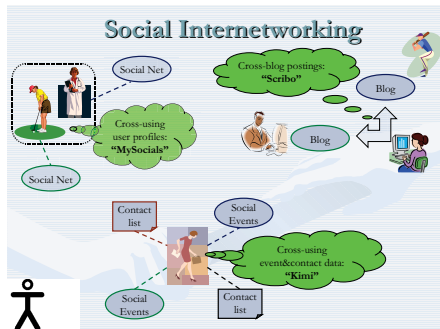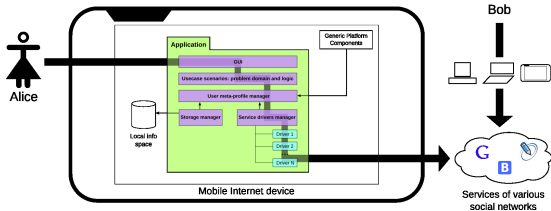
? Russian Mobile VAS Awards 2009: Sect. 8 *Usability*

Ongoing Maemo SE Projects: Mobile Trade
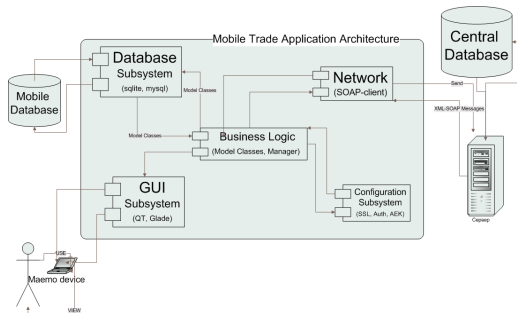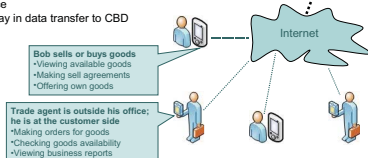
A Maemo Client for Web Services
of a Trading Business System

● ● ○ | 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

Mobile Trade Application Architecture

Database
Subsystem
(sqlite, mysql)

Mobile
Database

Model Classes

Network
(SOAP-client)

Central
Database

XML-SOAP Messages

Model Classes

Business Logic
(Model Classes, Manager)

GUI
Subsystem
(QT, Glade)

Configuration
Subsystem
(SSL, Auth, AEK)

USE

Maemo device

VIEW

? Russian Mobile
VAS Awards 2009:
Sect. 2 *Application for a
mobile device*

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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?

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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)

Project Metrics	My-Socials	Kimi	Scribo	Mobile Trade
LOC: total / comments	ANSI C: 10913 / 3081	ANSI C: 5746 / 1141	ANSI C: 11140 / 3273 Python: 707 / 88	C++: 4625 / 1435
System testing: tests / checks / runs	9 / 20 / 221	13 / 73 / 282	8 / 79 / 189	10 / 27 / 47
(wo)man-hours: total / persons / average	691 / 5 / 138	555 / 3 / 185	778 / 4 / 195	969 / 4 / 194

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Future . . .

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