

Student Software Engineering Projects for the Maemo Platform at Petrozavodsk State University: Architecture and Support of Distributed Developer Team Environment

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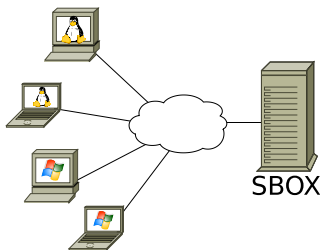
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Tasks and Requirements



- Hands-on training on Maemo SDK for at least 30 students.
- Each student has his own SDK environment.
- Easy deployment at guest trainings.
- Save time on desktops support and maintenance.
- Network connection requirements: low latency, high bandwidth.

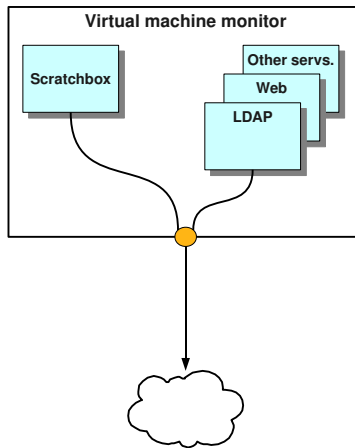


Training Environment

- Maemo SDK terminal server.
- Terminal client software (ssh, Xephyr).
- Training materials access.
- Local copy of the Maemo documentation and other guides.



Architecture



- Virtual machine monitor (Xen):
 - ▶ 32-bit virtual machine with Maemo SDK for each student,
 - ▶ 64-bit virtual machines (one or many) with:
 - ★ LDAP with students accounts;
 - ★ Web (Apache, PHP, MySQL, nginx, memcached, etc.);
 - ★ Samba, other support services.



Scratchbox Modifications

- Original Scratchbox can not be used by multiple users at the same time.
- The list of features we need for normal multiuser work:
 - ▶ Using the X session tunnelled over SSH.
Modified: `login`
 - ▶ Mounting host home directory.
Modified: `sbin/sbox_adduser`, `sbin/sbox_mount`
 - ▶ Distinct `/tmp` directory for each user.
Modified: `sbin/sbox_adduser`, `sbin/sbox_mount`



Other Software Components

- LDAP directory for accounts data.
- All information is provided using Web-based approach:
 - ▶ Learning management system for training materials.
 - ▶ Mirrored Maemo SDK documentation.
 - ▶ Wiki-based system for the training environment documentation.
- Performance optimization technologies were applied for the web-server (nginx, memcached, APC).



Solution for Guest Trainings

- Mobile solution for guest trainings: using a laptop.
- Restrictions: limited memory, slow hard disks.
- The same architecture with one VM for all administrative tasks.
- Actions on deployment:
 - ▶ registering students,
 - ▶ register the laptop in the network environment.
- Laptop can not run on battery long time.



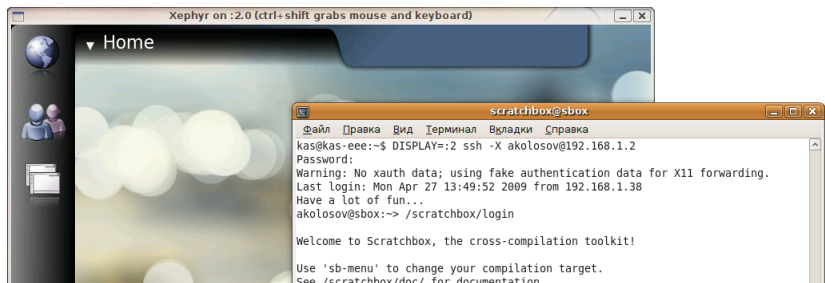
One Work Session Scenario

```
localhost$ Xephyr :20 -host-cursor -screen 800x480x16 \  
-dpi 96 -extension Composite
```

```
localhost$ DISPLAY=:20 ssh -X maemo.cs.prv
```

```
maemo.cs.prv$ /scratchbox/login
```

```
[sbox-DIABLO_X86: ~] > af-sb-init.sh start
```



Implementation Notes. Hardware

■ Server

- ▶ Two dual-core CPU, 2.5GHz.
- ▶ 8 Gb RAM.
- ▶ RAID 10, 689 Gb, 7200 RPM.

■ Laptop

- ▶ One dual-core CPU, 2.4GHz.
- ▶ 2 Gb RAM.
- ▶ 120 Gb HDD, 5400 RPM.



Implementation Notes. Software

- **OpenSUSE** operating system.
- **Xen** virtual machine monitor.
- **Maemo SDK**
- **OpenLDAP** directory server.
- **Nginx** and **Apache** web servers.
- **MySQL** database management system.
- **Moodle** learning management system.
- **Mediawiki** wiki software.



Summer School "Internet Tablet'2008", August 2008

- Petrozavodsk, PetrSU.
- 48 students.



Winter School “Internet Tablet’2009”, February 2009

- Petrozavodsk, PetrSU.
- 25 students.
- Laptop solution was tested.



FRUCT'09 Training, April 2009

- Saint Petersburg, SUAI.
- Near 30 students.
- Laptop solution have been applied.



Thanks for your attention!

Any questions?

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