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

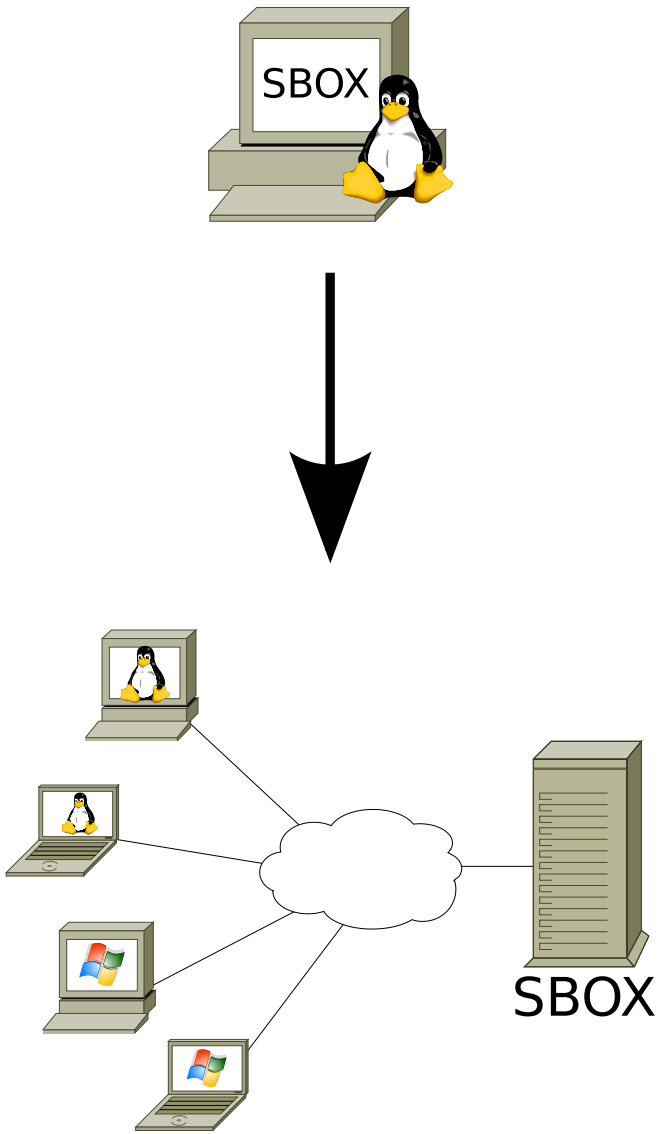
Vadim Ponomarev, Alexander Kolosov, Mikhail Kryshen

Petrozavodsk State University
Department of Computer Science

AMICT Seminar, May 20, 2009

Table of Contents

Tasks and Requirements

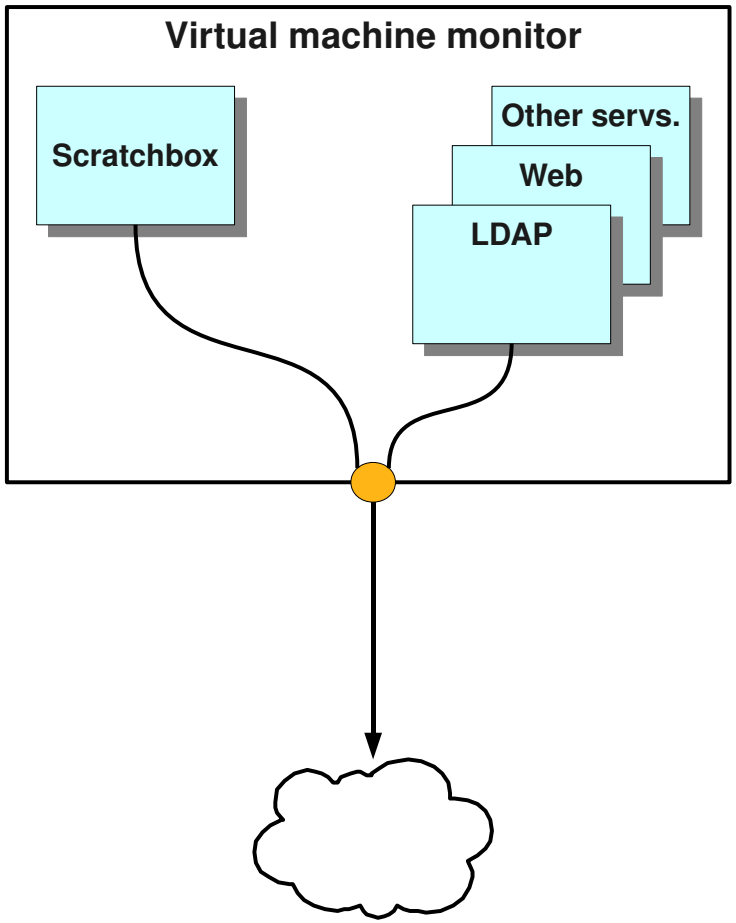


- Hands-on training on Maemo SDK for at least 30 students.
- Each student has his own SDK environment.
- Easy deployment at guest trainings.
- Save time on desktops support and maintenance.
- Network connection requirements: low latency, high bandwidth.

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.

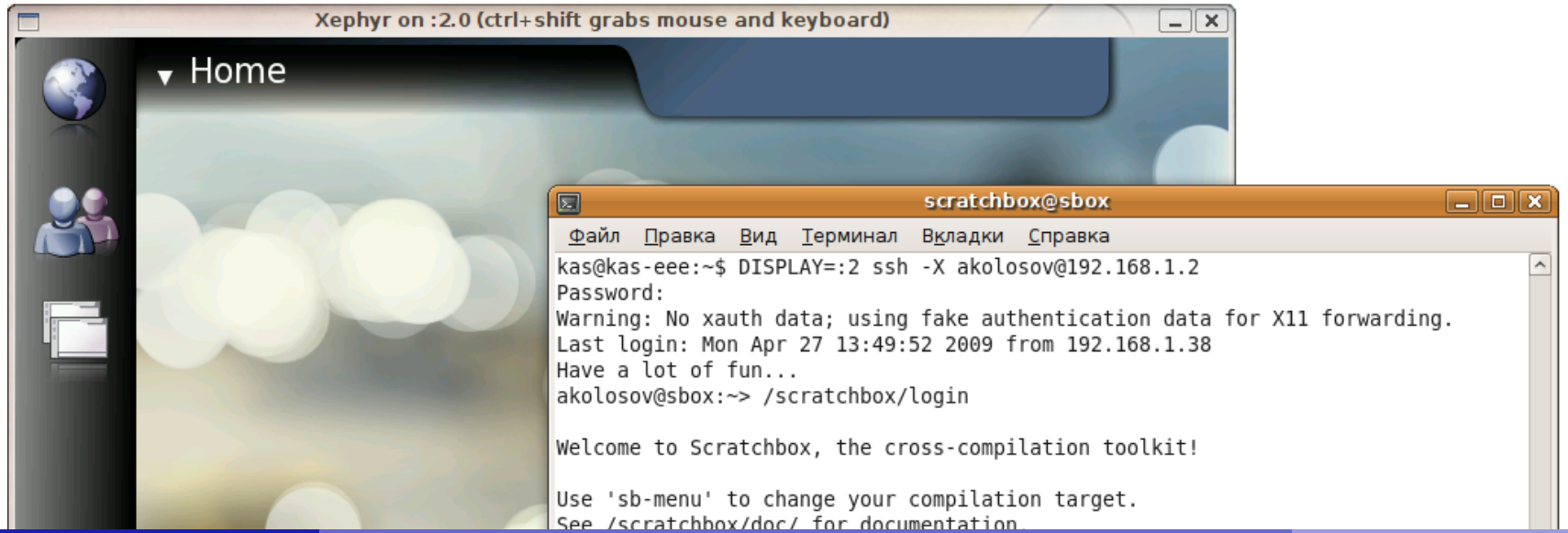
- Laptop can not run on battery long time.

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
  - One quad-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, 7200 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?

akolosov@cs.karelia.ru