



Open Testing – Key Success Factor for Open Standards

Vladimir Rubanov

Project Manager

Linux Verification Center

ISP RAS

Agenda



- About Linux Verification Center
- About OLVER project (open testing against LSB Core 3.1 standard)
- Current results and lessons learnt

Linux Verification Center



- Founded in 2005 with the support of **Russian Federal Agency for Science and Innovations**
- Based at the **ISP RAS**
- Coordinates with:
 - ◆ **Free Standards Group** (<http://freestandards.org/>)
 - ◆ **Austin Common Standards Revision Group** (<http://opengroup.org/austin/>)
 - ◆ **Gelato** (<http://gelato.org/>)

Linux Verification Center



Mission: propagating the Linux platform by ensuring its high reliability and compatibility through the use of open standards and advanced testing and verification technologies.

- ◆ **Developing test suites**
- ◆ **Improving open standards**
- ◆ **Dissemination of academic and industrial expertise**

OLVER Project



Open Linux VERification:

- Development of an open source test suite for functional testing against LSB Core 3.1 standard's requirements with regard to behavior of system interfaces.

Linux Standard Base (LSB)



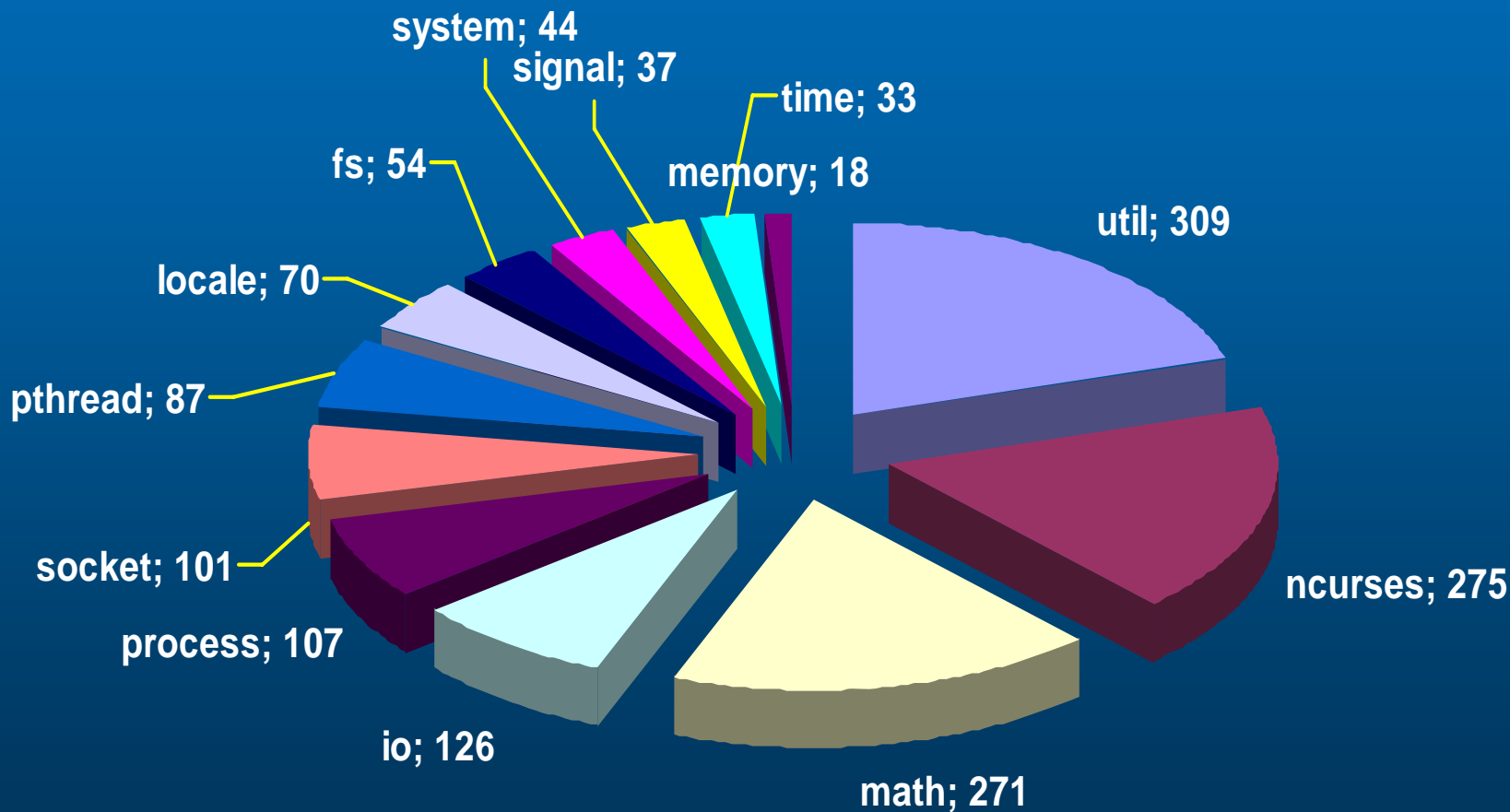
- Developed by Free Standards Group (www.linuxbase.org) since 2000
- LSB 1.0 – June 2001
- LSB 3.1 (current version) – October 2005
- Has become ISO/IEC 23360 standard in 2005
- Platinum Members: HP, IBM, Intel
- Gold Members: CA, Conectiva, Red Hat, Novell, MandrakeSoft, Miracle Linux, Sun Microsystems, Turbolinux, Asianux, etc.

LSB Core 3.1



- Specifies behavior of binary interfaces of the main system libraries (total 1532 functions)
- Defines directory structure and main system commands as well as ELF and RPM formats
- Refers to existing standards:
 - ◆ Single UNIX Specification (SUSv2, SUSv3)
 - POSIX
 - ◆ ISO C99
 - ◆ System V Interface Definition (SVID.3, SVID.4)
 - ◆ Large File Support (LFS)

LSB Core Interfaces



OLVER Project Tasks



- Analysis of LSB Core 3.1 standard's text and delineation of atomic requirements (assertions)
- Formalizing standard's assertions into SeC (Specification extension of C) specifications
- Developing test scenarios in SeC language
- Automatic test generation based on the formal specifications and test scenarios

Current Progress



- The standard's text has been analyzed for **1245 functions**
- Discovered and submitted **50 problem reports** for the text of LSB and POSIX standards
- Tests created for **1090 functions**

LSB Core Test Coverage



Subsystem	Interfaces	GLIBC	LSB	LTP	OLVER 0.6
fs	54	39	33	42	46
io	128	78	92	73	124
locale	70	56	60	19	57
math	271	259	31	39	8
memory	18	12	14	17	17
ncurses	275	0	59	3	263
process	106	61	77	81	85
pthread	87	79	66	80	87
signal	37	25	24	30	26
socket	101	34	2	56	79
system	44	20	15	23	39
time	33	23	26	27	33
util	308	187	144	76	202
Bcero	1532	873	643	566	1066

Motivating Citations



- *“Lack of testing threatening stability of Linux”*
 - **Andrew Morton**, Linux kernel maintainer.
- *“An interface standard is only as good as its testsuites”*
 - **Ian Murdock**, CTO, Free Standards Group
- *“Through the definition and testing of operating system interfaces, the LSB creates a stable platform that benefits both developers and users.”*
 - **Linus Torvalds**

Contacts



- Linux Verification Center

<http://linuxtesting.org>

<http://linuxtesting.ru>

info-lvc@linuxtesting.org

- Institute for System Programming of the RAS

<http://ispras.ru>

- Vladimir Rubanov

vrub@ispras.ru

+7-495-912-0754 ext. 4454