

Operating system Plan9 as the implementation of the GRID ideology

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“Distributed Computing and Grid-technologies in Science and Education”
(GRID 2016)
July 5, 2016

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Components I

- Resources discover and monitoring
- Resources allocation
- Communication
- Authentication
- Data access

Middleware I

- The mediator between tasks running on remote computers
- A set of software tools for messaging within the network, remote call procedures, access to resources
- It creates a single virtual environment for executing distributed applications, independent of the network services, hardware platforms, operating environments, and geographical remoteness

Implementations I

- Globus Toolkit
- UNICORE
- gLite

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Main conceptions

- All resources are represented as files and are available in a hierarchical file system
- Local and remote resources are not distinguished, 9P protocol is implemented for access to them
- Each process group has its own namespace. It is made up of the file hierarchies provided by different resources

Everything is a file I

Unix: Most the entities is a file

Files

- /dev/tty
- /proc

Not files

- network interfaces
- X Window

Everything is a file II

Plan9: Everything is a file

- /dev/cons
- /prog
- ftp
- tar
- network interfaces
- window system

Using IP I

- /net/dns: the resolution of domain names

```
% echo www.google.com!http > /net/dns
```

- Using a remote host for the connection

```
% import otherhost /net
```

```
% telnet tcp!www.google.com
```

9P protocol I

- Couple entire Plan9
- Distributed file system
- Only 17 messages: 3 to authenticate, 14 to take actions

Namespace I

- Manipulating namespace
 - bind
 - union
 - mount
 - unmount
- The standardized naming of services
- Locality
 - Unix: global namespace
 - Plan9: local namespace for each process

Authentication I

- The absence of superuser
- The authentication server: factotum

The user interface I

- Unix-like command line interface
- Unicode
- Text-based graphical user interface (like A2, former Bluebottle)
- Mouse centric interface
- Plumbing

The user interface II

The screenshot displays the Plan 9 desktop environment. At the top, there is a status bar showing the date and time (Sun Jun 11 12:45) and several user icons. Below this, a window titled 'Mail Newcol Kill Putall Dump Exit' is open, showing a list of messages. A file manager window is also visible, displaying a directory listing. In the foreground, a window titled 'Plan 9 from Bell Labs' is open, showing a white rabbit image and a terminal window. The terminal window displays the following text:

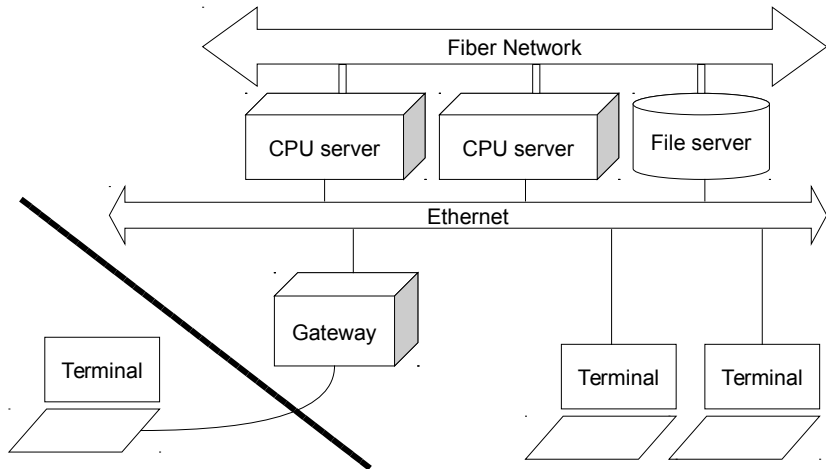
```

3-6 augrim, 4 -ym, 5 -ime,
-ime, 7 agrum, algrim. β. 4-6
jarosme, augorism(e), augrisme,
7-9 algorism, algorithm. (a. Ofr. augorisme, algorisme, augorime;
ad. med.l. algorism-us (cf. Sp. guarismo cipher), f. Arab. al-khawārizmī,
the native of Khwārazm (Khiva), surname of the Arab mathematician
Abu Ja'far Mohammed Ben Musa, who flourished early in the 9th
c., and through the translation of whose work on Algebra, the
Arabic numerals became generally known in Europe. (Cf. 'Euclid'
- plane geometry.) Algorisme being popularly reduced in Ofr.
to augorime. English also shows two forms, the popular augrime,
ending in agrim, agrum, and the learned algorism which passed

```

At the bottom of the screen, there is a navigation bar with various icons for window management and search.

Installation structure I



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Plan9 variants I

- Plan 9 from Bell Labs
- Plan 9 from User Space
- 9legacy. Set of patches to Plan 9 from Bell Labs
- 9atom
- 9front
- NIX — High performance cloud computing
- NxM. Kernel for NIX
- Harvey. Plan 9 with gcc and clang support
- Inferno

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- Unix: processes and threads
- Plan9: a single class of processes, allowing granular control of resource sharing (rfork)

APE is a set of headers and binaries libraries, built on ANSI C and POSIX interface

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- Communication: 9P2000
- Distributed authentication
- Distributed monitoring: devmon
- Resources discover: ResFS

Wer's nicht glaubt, bezahlt einen Taler