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**2005 Developer Forum & World Congress**

*Paris,  
France*





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# Apache Directory and the OSGi Service Platform



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# About the Speaker

- 80's & early 90's VAX, Mac, and Unix network admin
- Mid-90's MCS for Unix-to-NT migrations
- Late-90's Director of Global Systems for Fortune 100, 6 continents, over 100 sites MS migrations
- Summer 2004 Apache Kerberos, granted to ASF
- Apache Directory, PMC Member
- Apache Change Password, NTP, DNS
- Safehaus founder (Mobile phone OTP token)
- OATH representative (HOTP)



# Windows 2003 Log On – Kerberos Protocol

**Log On to Windows**

 Microsoft  
**Windows Server 2003**  
Enterprise Edition

Copyright © 1985-2003 Microsoft Corporation Microsoft

User name:

Password:

Log on to:

**EN**



# Windows Security

**Windows Security**

Microsoft  
**Windows Server 2003**  
Enterprise Edition

Copyright © 1985-2003 Microsoft Corporation Microsoft

**Logon Information**

You are logged on as EXAMPLE.COM\erodriguez.

Logon Date: 10/4/2005 3:34:53 PM

Use the Task Manager to close an application that is not responding.

Lock Computer	Log Off...	Shut Down...
Change Password...	Task Manager	Cancel

# Change Password Protocol

**Change Password**

  
Copyright © 1985-2003 Microsoft Corporation Microsoft

User name:

Log on to:  ▼

Old Password:

New Password:

Confirm New Password:

**EN**

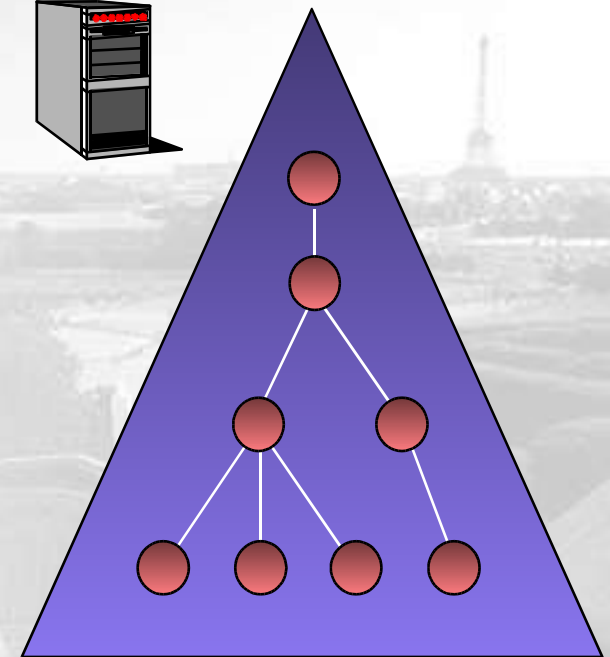
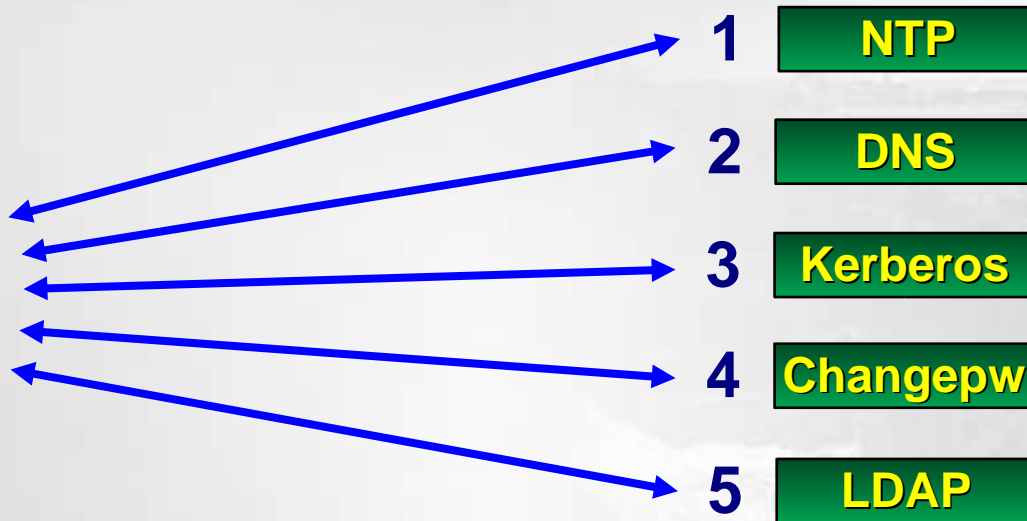
# Realm Control

EXAMPLE.COM

Apache Directory



workstation



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# Problem Statement

- Internal pressure (development environment)
  - Platforms: Linux, Mac, Windows ... and mobile phones
  - Complexity: RFC's, multi-master replication, ACI
  - Nature of open-source: time zones, work schedules
- External pressure (interested parties)
  - OSS community: permutations
  - Enterprise: robustness (long running services)
  - Fortune 9,000,000: ease-of-use
  - Vendors: extensibility (add-ons, embedding)



# Solution: OSGi Service Platform

- Development environment
  - Community involvement (Apache HTTPD mod\_\*)
  - Jetty Bundle, JMX Bundles, choice of implementation
  - Further out: mobile phones w/ Safehaus HausKeys
- Demands from community
  - LDAP Server or Kerberos Server or DNS Server
  - LDAP or JMX or Felix Console or Web UI
  - Embeddable Directory or Realm Controller
  - HOTP/SAM plugins for Kerberos



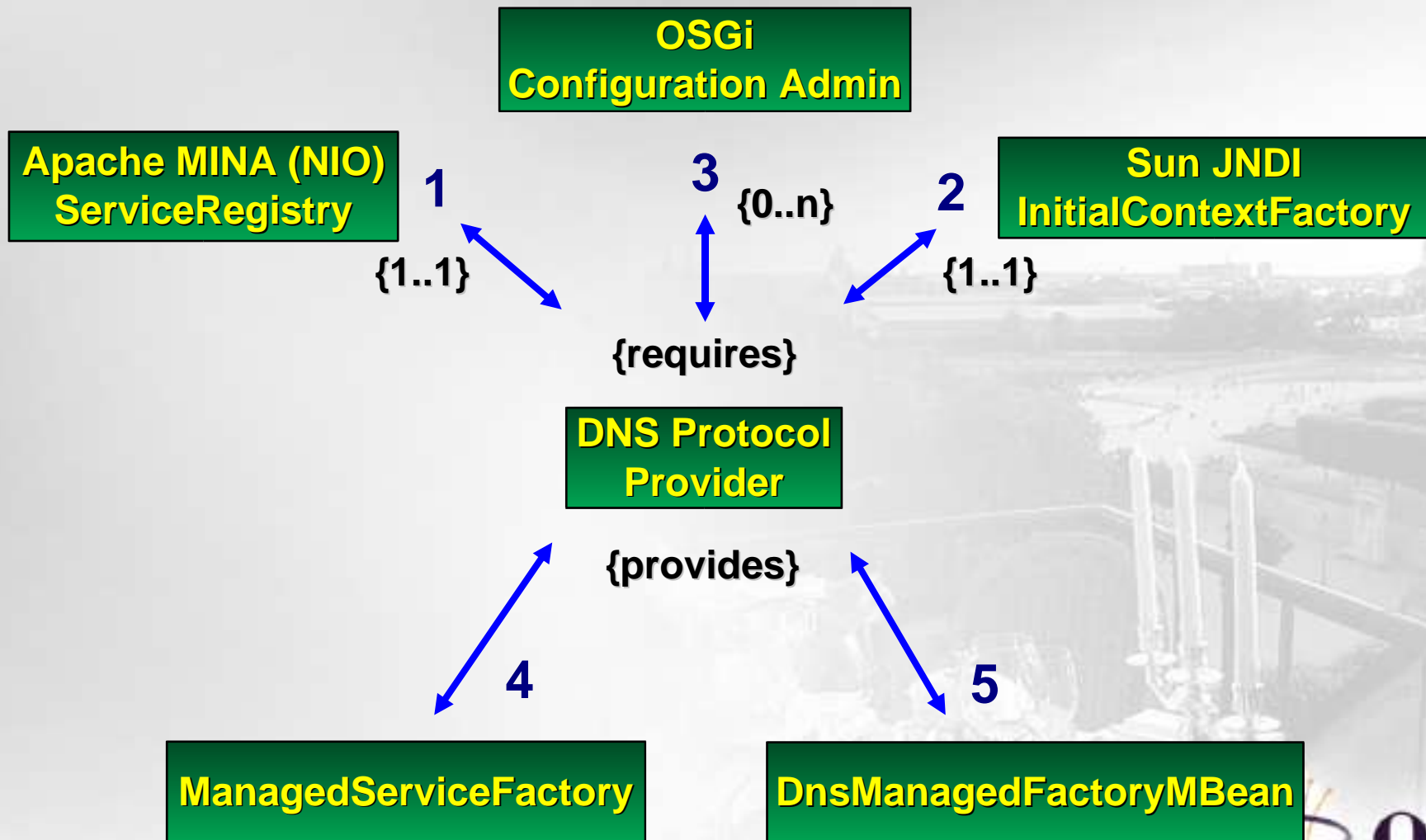
# Bundle Breakdown

- Apache Directory
  - Backing Store (JNDI InitialContextFactory)
  - NIO Networking Layer (MINA ServiceRegistry)
  - 5 Protocol Providers (ManagedServiceFactory, MBean)
- Administration
  - Embedded web UI (HttpService)
  - JMX (MBeanServer)
  - Felix Commands ( 'load /path/to/LDIF' )
- ConfigurationAdmin, Service Binder

# Apache Felix Installed Bundles

```
Terminal
File Edit View Terminal Tabs Help
-> ps
START LEVEL 1
  ID  State      Level Name
[  0] [Active]   ] [  0] System Bundle (1.0.5)
[  1] [Active]   ] [  1] Shell Service (1.0.2)
[  2] [Active]   ] [  1] Shell TUI (1.0.0)
[  3] [Active]   ] [  1] Bundle Repository (1.1.2)
[  4] [Active]   ] [  1] OSGi Service (1.0.2)
[  5] [Active]   ] [  1] OSGi Util (1.0.0)
[  6] [Active]   ] [  1] Service Binder (1.1.2)
...
[ 10] [Active]   ] [  1] HTTP Service (1.1.2)
[ 11] [Active]   ] [  1] Servlet (1.0.0)
[ 12] [Active]   ] [  1] Safehaus Realm Admin (0.1.1)
...
[ 20] [Active]   ] [  1] Apache Backing Store (0.1.1)
[ 21] [Active]   ] [  1] Apache LDIF Loader (0.1.1)
[ 22] [Active]   ] [  1] Apache Configuration Admin Bundle (0.1.1)
[ 23] [Active]   ] [  1] Apache MINA Network Service Registry (0.1.1)
[ 24] [Active]   ] [  1] Apache LDAP Network Service (0.1.1)
[ 25] [Active]   ] [  1] Apache NTP Network Service (0.1.1)
[ 26] [Active]   ] [  1] Apache DNS Network Service (0.1.1)
[ 27] [Active]   ] [  1] Apache Kerberos Network Service (0.1.1)
[ 28] [Active]   ] [  1] Apache Change Password Network Service (0.1.1)
...
[ 30] [Active]   ] [  1] JMX-MX4J Agent Service (2.0.2)
[ 31] [Active]   ] [  1] JMX rmiregistry (2.0.4)
[ 32] [Active]   ] [  1] JMX rmi connector (2.0.5)
[ 33] [Active]   ] [  1] OSGi MBean (2.0.5)
->
```

# Dependency Resolution with Service Binder





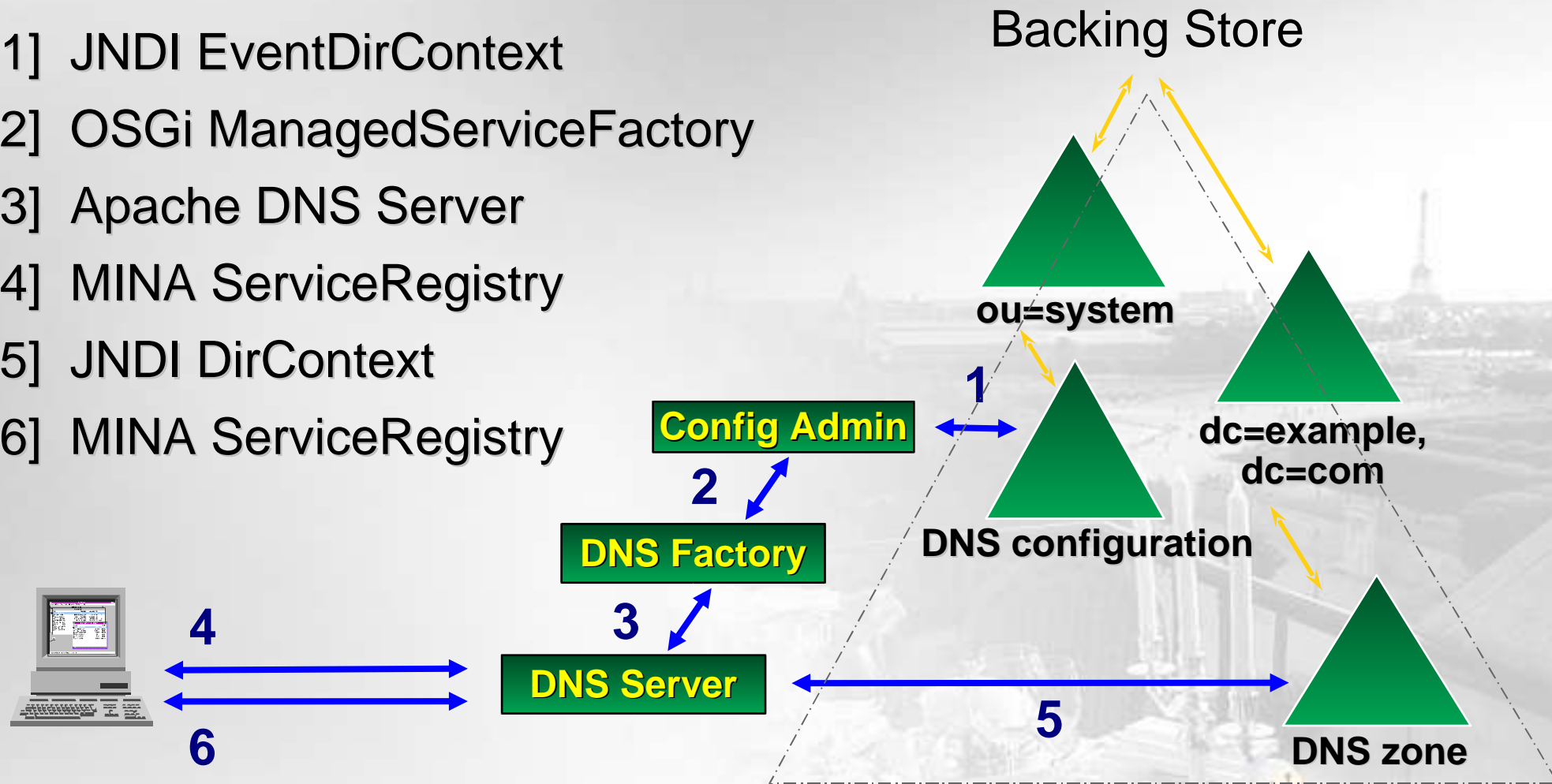
# Service Binder Metadata

```
/root/osgi prezo/metadata.xml - gedit
File Edit View Search Tools Documents Help
metadata.xml x
1 <?xml version="1.0" encoding="UTF-8"?>
2 <!--<!DOCTYPE bundle SYSTEM "metadata.dtd">-->
3 <bundle>
4   <component class="org.apache.dns.DnsServerFactory">
5     <provides service="org.osgi.service.cm.ManagedServiceFactory"/>
6     <provides service="org.apache.dns.DnsServerFactoryMBean"/>
7     <property name="service.pid" value="org.apache.dns.factory" type="string"/>
8     <requires
9       service="org.apache.mina.registry.ServiceRegistry"
10      cardinality="1..1" policy="static" ...
11   />
12   <requires
13     service="javax.naming.spi.InitialContextFactory"
14     cardinality="1..1" policy="static" ...
15   />
16   <requires
17     service="org.osgi.service.cm.ConfigurationAdmin"
18     cardinality="0..n" policy="dynamic" ...
19   />
20 </component>
21 </bundle>
```



# Configuration and Serving

- [1] JNDI EventDirContext
- [2] OSGi ManagedServiceFactory
- [3] Apache DNS Server
- [4] MINA ServiceRegistry
- [5] JNDI DirContext
- [6] MINA ServiceRegistry



# DNS Configuration

- IP port
  - 10053 --> 53
- “Active” partitions
  - example.com --> apache.org
- Server instance
  - service.pid: org.apache.dns.1
    - IP address: 192.168.0.1, port: 53
    - search base: dc=example,dc=com
  - service.pid: org.apache.dns.2
    - IP address: 10.0.0.1, port: 53
    - search base: dc=apache,dc=org

# Configuration Admin with LDAP and DNS

The screenshot shows the JXplorer application window. The left pane displays a tree view of the LDAP hierarchy. The right pane shows the details for the selected entry, `org.apache.dns.1`.

**LDAP Tree View:**

- World
  - system
    - admin
    - configuration
      - interceptors
      - partitions
      - services
        - dns
          - org.apache.dns.1**
          - org.apache.dns.2
  - dns
    - forward lookup zones
      - example.com
        - A:www.example.com
        - CNAME:www.example.com
        - MX:example.com
        - NS:ns1.example.com
        - PTR:1.0.168.192.IN-ADDR.ARPA
        - SOA:example.com
        - SRV:\_ldap.\_tcp.example.com
    - reverse lookup zones
  - groups
  - sysPrefRoot
  - users

attribute type	value
objectClass	extensibleObject
baseDn	dc=example,dc=com
cn	org.apache.dns.1
ipAddress	192.168.0.1
port	53
service.factoryPid	org.apache.dns.factory
service.pid	org.apache.dns.1

Submit    Reset    Change Class    Properties



# What's Next?

- Apache Directory
  - 1.0 Release by March 2006
  - Finer-granularity (core interceptors, Kerberos SAM)
- Apache Felix
  - Configuration Admin (separate store, R4 update)
  - Prefs Admin, User Admin (typical LDAP data)
- Apache
  - Critical mass of bundles
  - OBR/Update site
  - Cocoon, JAMES?, Geronimo?



# Thank you!

- ApacheCon US 2005 (December, San Diego, CA)
  - In-depth “realm control” with Apache Directory
- Apache Directory Project
  - <http://directory.apache.org>
- Apache Felix Project
  - <http://incubator.apache.org/projects/felix.html>
- Safehaus HausKeys, Mitosis, TripleSec
  - <http://hauskeys.safehaus.org/>
  - <http://mitosis.safehaus.org/>
  - <http://triplesec.safehaus.org/>

