

# HP Secure Webserver (Apache) for OpenVMS with Tomcat

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# Agenda

- Overview & history of Apache
- HP Secure Web Server
- Futures
- Installation
- Configuring the Server
- Optional Modules
- Security
- Tomcat

# The Apache web server

- HTTP server based on National Center for Supercomputing Applications developed web server httpd
- U.S. Government funded NCSA httpd so the software is in the public domain
- User community worked together to share modifications.
  - The result was “a patchy server”, hence the name Apache

# The Apache web server

- Those making the modifications became known as The Apache Group
  - Now known as the Apache Software Foundation
  - <http://www.apache.org/>
  - Supported by companies such as HP, IBM and Sun
- The Apache Software Foundation sponsors numerous other projects
  - SOAP, Xerces (XML), Jakarta, TOMCAT (JSP), ...
- Many enhancements for the server are available
  - Perl, JServ, JSSI, ...

# Apache HTTP Server

- HTTP/1.1 (RFC2616) compliant web server
- Highly configurable and extensible
- Customized using the Apache module API
- Complete source code, non-restrictive license
- Runs on OpenVMS, Windows, UNIX, and other OS platforms
- Active, global development community
- Most popular web server on the Internet (63.16% vs 26.85% for IIS – June 2003)
  - [http://news.netcraft.com/archives/web\\_server\\_survey.html](http://news.netcraft.com/archives/web_server_survey.html)

# HP Secure Web Server for OpenVMS (SWS)



- Based on recent Apache HTTP baselevels
- Tailored for OpenVMS cluster and security architecture
- Includes SSL (certificate-based authentication and encryption services for sockets)
- VeriSign supported platform  
<http://www.verisign.com/support/install/>
- Multiple scripting capabilities (CGI, Java, Perl, PHP)

# SWS (continued)

- DEFCON9 (“Cool and Unhackable”)  
<http://www.defcon.org/>
- Netcraft recognizes OpenVMS platform  
<http://www.netcraft.com/>
- OpenVMS external web site is running SWS  
<http://h71000.www7.hp.com/>
- SWS source code is available on the web
- User contributions (ht://Dig, SWISH-E, Python...)

# SWS (continued)

- Supported modules (as of SWS 1.3)
  - Standard Apache modules
    - mod\_access, mod\_actions, mod\_alias, mod\_asis, mod\_auth, mod\_autoindex, mod\_cgi, mod\_define, mod\_dir, mod\_env, mod\_imap, mod\_include, mod\_info, mod\_log\_config, mod\_mime, mod\_negotiation, mod\_proxy, mod\_rewrite, mod\_setenvif, mod\_so, mod\_ssl (DSO), mod\_status, mod\_unique\_id, mod\_user\_dir
  - OpenVMS-unique modules
    - mod\_auth\_openvms (DSO), mod\_osuscript
  - Optional modules
    - mod\_jk, mod\_jserv, mod\_perl, mod\_php, mod\_DAV
    - Above modules are DSO
  - User written modules (not supported by HP though)
    - mod\_put, mod\_python etc



# SWS Shipping today

- SWS V1.3 shipped October 2002 (based on Apache 1.3.26)
  - suEXEC for running CGI scripts under a different username
  - WebDAV
    - Distributed Authoring & Versioning aka “poor man’s Pathworks”
  - OpenSSL 0.9.6b
  - Enhancements to MOD\_AUTH\_OPENVMS
    - Require group using rights identifier
  - New server configuration features
    - startup, shutdown & tag

# SWS Futures

- SWS 2.0
  - Based on Apache 2.0.46
  - Field test kit shipping today (based on 2.0.44)
  - Scheduled for Q3 2003
  - Implements the pre-fork, not the multi-threaded model
    - Similar to SWS V1.3
  - Includes IPv6 support (runs on either stack)
  - Requirements:
    - ODS-5
    - VMS 7.3-1 or later
    - TCP/IP 5.3 (runs on Multinet and TCPWare)
    - Stream-LF record formats only
  - No Perl/PHP/Tomcat (still experimental)

# SWS Futures

- SWS 1.4
  - Based on Apache 1.3.28 (or .29)
  - Scheduled for Q3 2003
- Initial release on OpenVMS I64
  - SWS (based upon Apache 1.3)
  - SWS\_JAVA
  - SWS\_PHP
  - SWS\_PERL
  - Perl
  - Scheduled for Q4 2003

# SWS Installation

- Download kit

- Decompress

```
$ RUN CPQ-AXPVMS-CSWS-V0103--1.PCSI-DCX-AXPEXE
```

- Install kit onto ODS-5 disk

```
$ PROD INST CSWS /DEST=device:[directory-name]
```

- Configure Apache

- `$ @SYS$STARTUP:APACHE$CONFIG`

# SWS Installation (cont.)

- APACHE\$CONFIG.COM
  - Creates APACHE\$WWW account
  - Creates systemwide logical names
  - Optionally adds support for MOD\_SSL & MOD\_suEXEC
  - Sets correct ownership on SWS files
- APACHE\$STARTUP.COM
- APACHE\$SHUTDOWN.COM

# SWS Installation (cont.)

- Test installation by telnet

**telnet host 80**

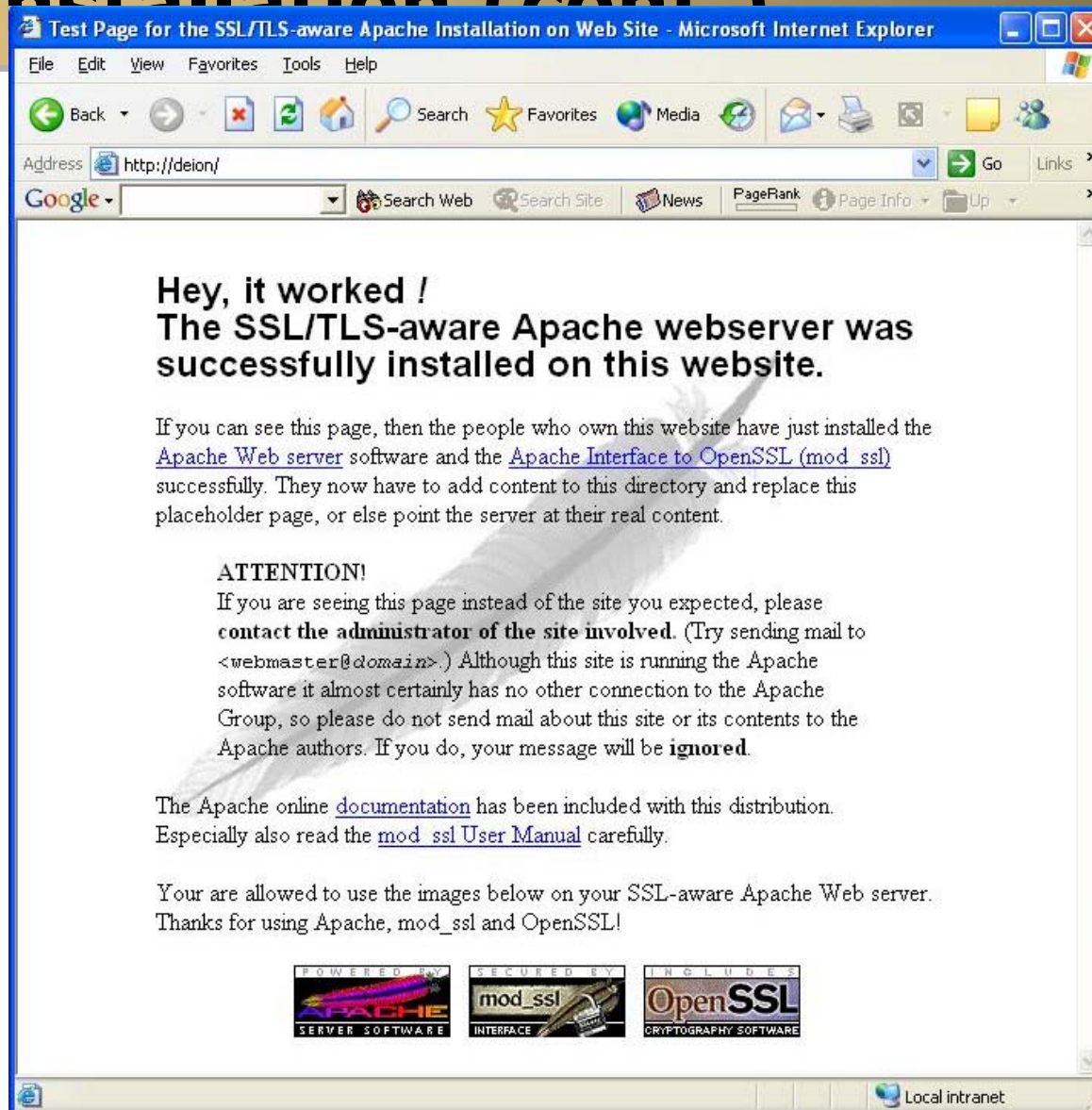
**HEAD / HTTP/1.0**

**Press ENTER twice**

# SWS Installation (cont.)

HTTP/1.1 200 OK  
Date: Wed, 21 May 2003 09:44:06 GMT  
Server: Apache/1.3.26 (OpenVMS) mod\_jk/  
.10 OpenSSL/0.9.6b  
Content-Location: index.html\_en  
Vary: negotiate,accept-language  
TCN: choice  
Last-Modified: Tue, 20 May 2003 10:59:2  
ETag: "1c0574-a71-3eca0a8a;3eca43d7"  
Accept-Ranges: bytes  
Content-Length: 2673  
Connection: close  
Content-Type: text/html  
Content-Language: en  
Expires: Wed, 21 May 2003 09:44:06 GMT

# SWS Installation (cont)

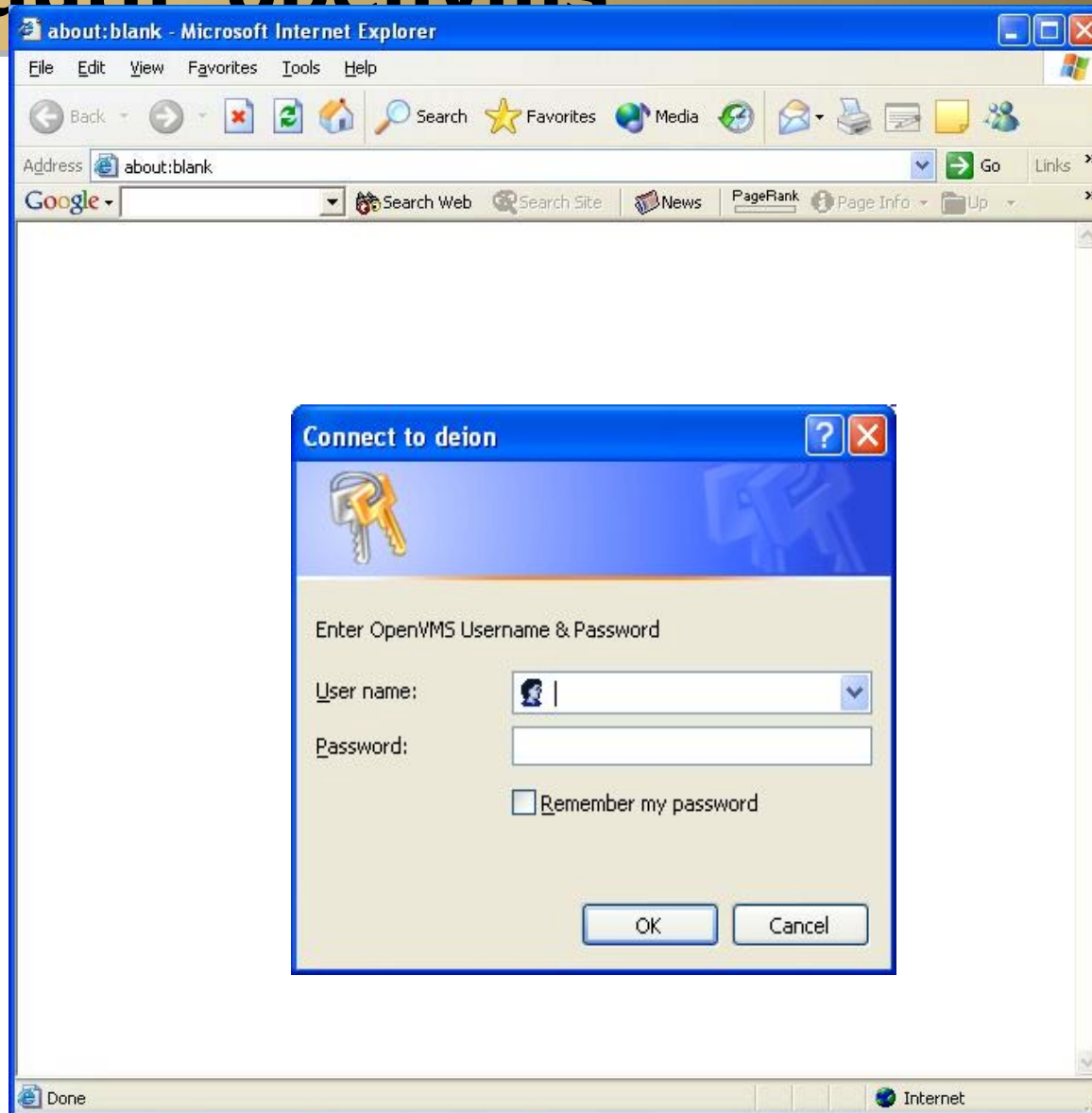




# Configuring the Server

- apache\$root:[conf]httpd.conf (text file)
  - Define server and virtual host configuration
  - Define loadable module configuration
  - Define document types and handlers
  - Define document directories and access control
  - Define access and error log files and formats
- Changes to httpd.conf require a restart
- See <http://<servername>/manual/> for on-line documentation or see comments in httpd.conf

# mod\_auth\_openvms



# SWS Optional Products Shipping Today



- Optional products:
  - SWS\_JAVA 1.0 (mod\_jk, mod\_jserv)
    - Tomcat 3.2.1(Java Server Page technology JSP 1.1 & Servlets 2.2)
    - Jserv/JSSI 1.1.1(original Java servlet technology Servlets 2.0)
  - SWS\_JAVA 2.0 shipped October 2002
    - (Tomcat 4.0.4, JSP 1.2, Servlet 2.3, Ant )
  - SWS\_PERL V1.1 (mod\_perl 1.25)
    - Embeds Perl interpreter in server process
    - Caches Perl scripts in memory for faster execution
  - PERL 5.6.1
    - Interpreter for use with CGI or mod\_perl
    - PERL := \$PERL\_ROOT:[000000]PERL.EXE for standalone use

# SWS Optional Products Shipping Today (continued)



- SWS\_PHP V1.0 (mod\_php 4.0.4pl1)
  - PHP scripting language embedded within HTML
- SWS\_PHP V1.1 (mod\_php 4.1.1) shipped October 2002

# SWS Optional Products Futures



## ■ SWS\_JAVA V2.1

- Based on Tomcat 4.1.24
- Supports JSP 1.2, Servlet 2.3, Ant
- in Beta today
- Scheduled for Q3 2003
- Will work with SWS 1.3 or 2.0

## ■ SWS\_PHP V1.2

- Based on PHP 4.3.2
- Schedule for Q3 2003
- Will work with SWS 1.3 or 2.0

# Security

- On OpenVMS, servers and CGI scripts run under the `APACHE$WWW` user profile (unprivileged)
  - Server never runs as “root” like on UNIX (although the server eventually forks as “nobody”, certain functions execute as “root”, see TransferLog)
- Operations that require privileges are implemented as user-written system services
  - Bind to “privileged” socket (80), `auth_openvms`, ...
  - These services can be disabled
- SSL provides strong authentication and encryption capabilities
- SWS directories are owned by `APACHE$WWW` with no world-read/write access

# Security (continued)

- Running a web server opens a window to your network - that's a web server's purpose in life
- Damage from web server security violations can simply be embarrassing or lead to large financial losses or potentially involve legal liability
- Security violations result from buggy software (more complex software, more bugs) and/or configuration mismanagement
- Server extensions (CGI, Perl, Java, etc.) add complexity and potential security holes

# Tomcat

- Jakarta is the "overall" project for many subprojects. For example, Tomcat is the servlet+JSP engine which is a subproject of the Jakarta project. Many people confuse Jakarta and Tomcat together even though the reality is that Jakarta is essentially just this website and Tomcat is a product on this website.
- Tomcat is the official reference implementation for the Java servlet and JavaServer pages technologies. The Java Servlet and JavaServer pages specifications are developed by Sun under the Java community process.
- Tomcat is developed in an open and participatory environment and released under the Apache software license.



# What is a Java Servlet Page (JSP)

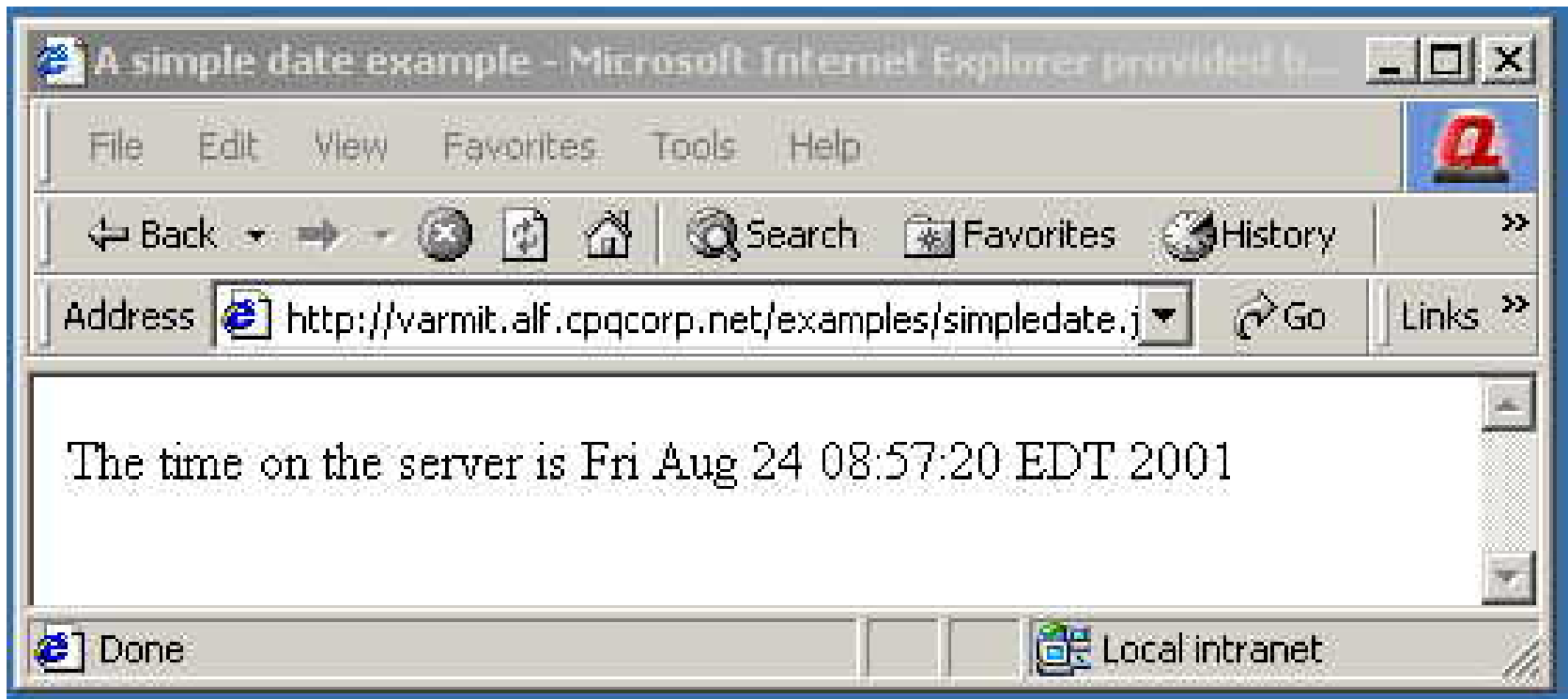


- JavaServer Pages technology uses XML-like tags and scriptlets written in the Java programming language to encapsulate the logic that generates the content for the page.
- Separation of form and function.
  - Function (Servlets, Java Beans, EBJ).
    - Java programmer can code develop a library of dynamic functions and features.
  - Form.
    - Web designer concentrated on the design layout of the static HTML page, and add dynamic features with the library.

# Simple JSP Example

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML  
4.0 Final//EN">  
<HTML>  
<HEAD>  
<TITLE>A simple date example</TITLE>  
</HEAD>  
<BODY COLOR=#ffffff>  
The time on the server is  
<%= new java.util.Date() %>  
</BODY>  
</HTML>
```

# Simple Date – Browser Output



# What are Java Beans and EJBs?

- Java Bean
  - Simple terms Java Beans are runtime libraries.
- Enterprise java bean.
  - In Sun's terms: EJB, the widely-adopted server-side component architecture for Java™ 2 platform, enterprise edition (J2EETM), enables rapid development of mission-critical application that are versatile, reusable and portable across middleware while protecting IT investment and preventing vendor lock-in.

# Why use JSPs, Beans and EJBs

- JSPs, Beans, and EJBs support the separation of form and function
- Do you really want your Java programmers to design the company logo?
  - They should be working on the company's EJBs
- Do you really want your web artists doing your Java programming?
  - They should be working on the design layout of the web site and use EJBs to display information
- Using JSP, both parties can truly work independently of each other using JavaBeans

# What are Servlets?

- Servlets are programs written in Java to extend the functionality of HTTP servers
- Replacement for CGI scripts and programs
  - Servlets are faster and scale with multiprocessors
  - User Session Tracking built in!
  - Cross platform (hardware and web server)
- Applet is to client as Servlet is to server
- Supported by all major web servers
- Its Java!

# Hello.java - Servlet example

```
import java.io.*;
import javax.servlet.*;
import javax.servlet.http.*;

public class Hello extends HttpServlet
{
    public void doGet (HttpServletRequest request,
                      HttpServletResponse response)
        throws ServletException, IOException
    {
        PrintWriter out;
        String title = "Example Java Servlet";
    }
}
```

# Hello.java (cont.)

```
// set content type and other response header fields first
response.setContentType("text/html");

// then write the data of the response
out = response.getWriter();

out.println("<HTML><HEAD><TITLE>");
out.println(title);
out.println ("</TITLE></HEAD><BODYbgcolor=\"#FFFFFF\">");
out.println("<H1>" + title + "</H1>");
out.println ("<H2> Congratulations, HelloWorld Servlet is working<br>");
out.println("</BODY></HTML>");
out.close();
}
}
```





# Web Server Adapters

## Mod\_jk and Mod\_jserv

- Web server adapter to sit in Apache and redirect requests to Tomcat.
  - \*.jsp or servlet/ requests are redirected to Tomcat
  - \*.html (non-Java requests) are served by Apache
- Two adapters are available
  - Mod\_jserv
  - Mod\_jk

# Mod\_jk

- New adapter
- Supports
  - AJP v1.2 and V1.3 protocol
  - Supports other web servers
  - Jk library makes it easier to support Apache 1.3.X
  - AJP V1.3 is faster than AJP V1.2
- [http://jakarta.apache.org/tomcat/tomcat-3.3-doc/mod\\_jk-howto.html](http://jakarta.apache.org/tomcat/tomcat-3.3-doc/mod_jk-howto.html)

# Mod\_jk2

- The newest JK2 is a refactoring of JK. The native part has been completely restructured and the configuration has been simplified a lot
  - AJP v1.2 and V1.3 protocol
  - Supports other web servers
  - Jk2 library makes it easier to support both Apache 1.3.X and Apache 2.x.x
  - AJP V1.3 is faster than AJP V1.2
  - Load Balance support
  - Workers2.properties
- **<http://jakarta.apache.org/tomcat/tomcat-4.1-doc/jk2/index.html>**


# Worker2.properties

```
[lb:lb]
info=Default load balancer.
# Example socket channel, override port and host.
[channel.socket:localhost:8009]
port=8009
host=127.0.0.1
group=lb
# define the worker
[ajp13:localhost:8009]
channel=channel.socket:localhost:8009
# Uri mapping
[uri:/examples/*]
group=lb
#worker=ajp13:localhost:8009
[status:]
info=Status worker, displays runtime informations
[uri:/jkstatus/*]
info=Display status information and checks the config file for changes.
group=status:
```

# Mod\_webapp

- Newest adapter
- Supports
  - Tomcat 4.0
  - Supports other web servers
  - Support Apache 2.0
  - Better blend with Apache and Tomcat  
(invisibly integrate )
  - **<http://jakarta.apache.org/tomcat/tomcat-4.1-doc/config/webapp.html>**

# Books and Specifications

- ***HTML: The Definitive Guide***, Chuck Musciano and Bill Kennedy, 1998, O'Reilly
- ***Apache Server Bible***, Mohammed J. Kabir, 1998, IDG Books
- ***Apache Server Unleashed***, Rich Bowen and Ken Coar, 2000, SAMS
- ***Apache, The Definitive Guide***, Ben Laurie and Peter Laurie, 1999, O'Reilly
- ***Writing Apache Modules with Perl and C: The Apache API and mod\_perl***, Lincoln Stein and Doug MacEachern, 1999, O'Reilly
- ***Professional Apache***, Peter Wainwright, 1999, Wrox Press Ltd.
- ***SSL and TLS, Designing and Building Secure Systems***, Eric Rescorla, 2000, Addison-Wesley
- **OpenVMS with Apache, OSU, and WASD, The Nonstop Webserver**, Alar Winston, Digital Press 
- HTTP 1.1 protocol specification,  
<http://www.ietf.org/rfc/rfc2616.txt>
- TLS 1.0 (SSL 3.0) protocol specification,  
<http://www.ietf.org/rfc/rfc2246.txt>

# More Information

- CSWS web site  
<http://h71000.www7.hp.com/openvms/products/ips/apache/csws.html>
- OpenVMS eBusiness technologies  
<http://h71000.www7.hp.com/ebusiness/technology.html>
- Apache Software Foundation <http://www.apache.org/>
- PHP: Hypertext Processor <http://www.php.net/>
- MySQL <http://www.mysql.com/>
- phpMyAdmin to manage MySQL  
<http://www.phpmyadmin.net/>
- Download MySQL & Python for OpenVMS  
<http://www.pi-net.dyndns.org/anonymous/jfp/>





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