IBM HTTP Server for iSeries (Powered by Apache)

Jim Fall

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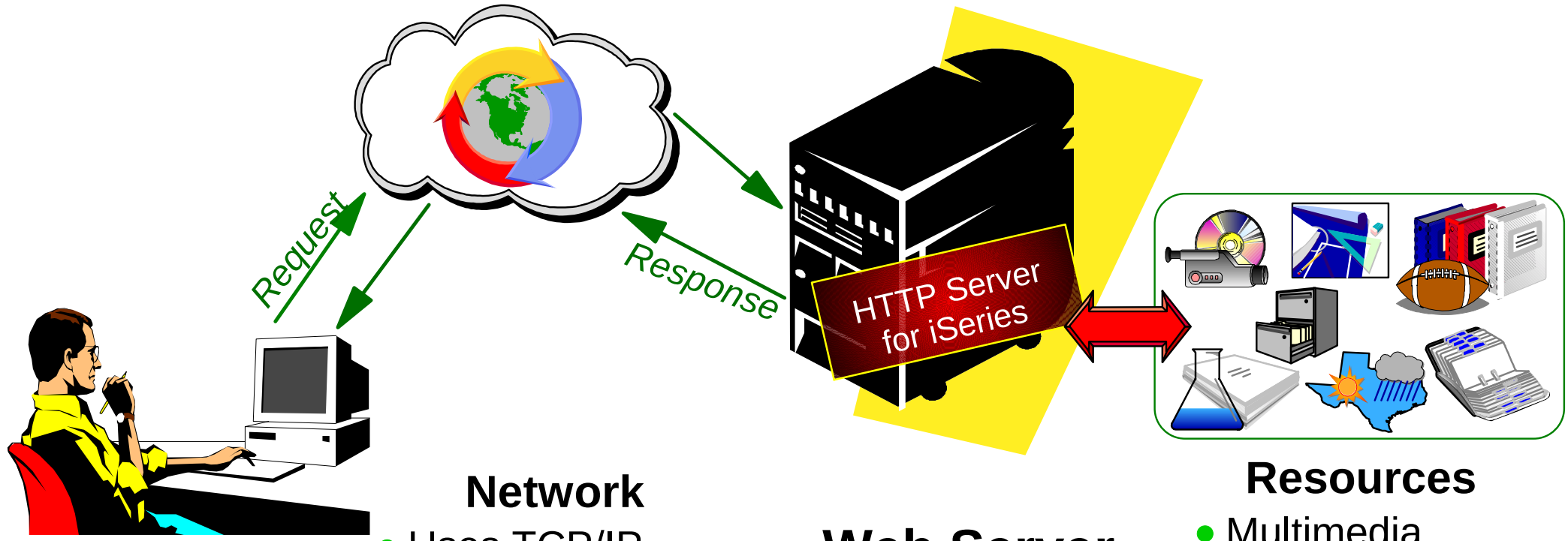
Agenda

- What is an HTTP Server?
- History of HTTP Servers
- IBM's HTTP strategy
- What is Apache?
- Benefits of Apache over Original
- Apache Features and iSeries Customization
- Configuration, migration, Apache concepts
- Product Packaging
- More Information

What is an HTTP Server?

- Web Server
- Listens for requests
- Accepts requests from Web clients (browsers and other applications)
- Processes the request (finds the file, generates a dynamic web page, runs a CGI program)
- Returns a "Web page" to the requester
- HTTP is Hyper Text Transfer Protocol
  - Protocol for communication between client-server
- Most allow secure transactions
- Most track requests in log files
- Most support CGI (Common Gateway Interface) programs

What is an HTTP Server?



Browser

- Application Client
- Talks HTTP
- Issues Requests
- Renders Responses

Network

- Uses TCP/IP
- Routes Requests & Responses
- *Possibly the Internet*

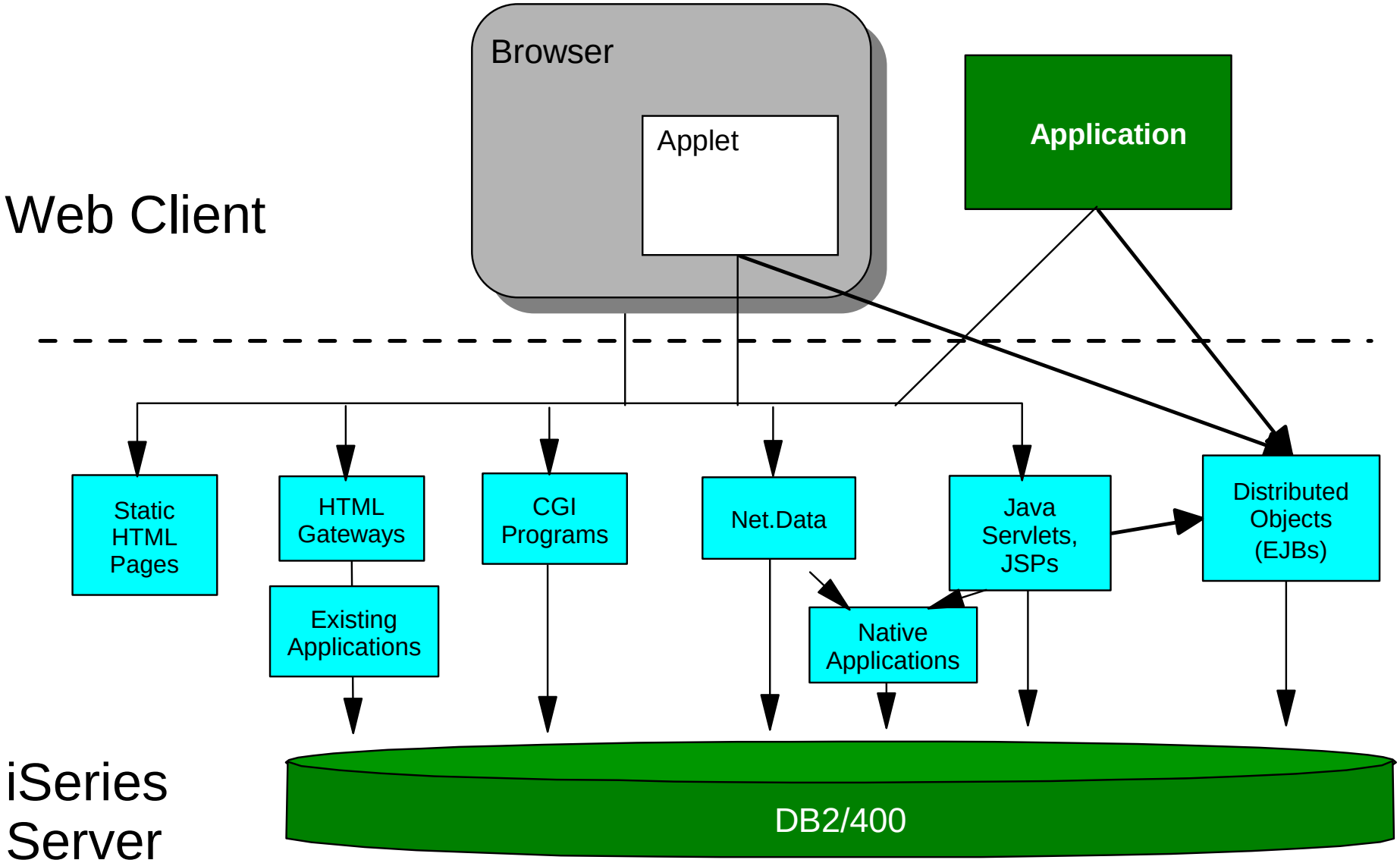
Web Server

- Application Server
- Talks HTTP
- Handles Requests
- Sends Response

Resources

- Multimedia
- Blueprints & Diagrams
- Files & Reports
- Applications
- Forecast Data
- Marketing Data

What is an HTTP Server?



History of HTTP Servers

- Most HTTP servers originated from CERN or NCSA
  - CERN - European Lab for Particle Physics, origination of the world wide web
  - NCSA - National Center for Supercomputing Application, discontinued in 1994
- 2 different implementations provide similar services
- Prior to 2001 IBM's HTTP server products were CERN-based
- Apache is NCSA-based
- Name originated from "a patchy NCSA server"
- Apache Software Foundation formed in 1995
- Apache is available on 30+ platforms
- Platforms that provide all source code to users are true "Apache"
- IBM iSeries does not provide source code
- IBM iSeries HTTP product is "Powered by Apache"

History of HTTP Servers

Server usage

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Top servers for active Web sites on Internet:

- 56% Apache
- 26% Microsoft IIS
- 1% iPlanet
- 1% Zeus

Source: February 2002 Netcraft http://www.netcraft.com/survey/

What server is that Web site running?

http://www.netcraft.com

Top left, click on link: What's that site running?

Examples:

www.ibm.com	AIX:	IBM_HTTP_Server/1.3.12.2 Apache/1.3.12 (Unix)
www.ignite400.com	AS/400:	IBM-HTTP-Server/1.0
www.common.org	AS/400:	IBM-HTTP-Server/1.0

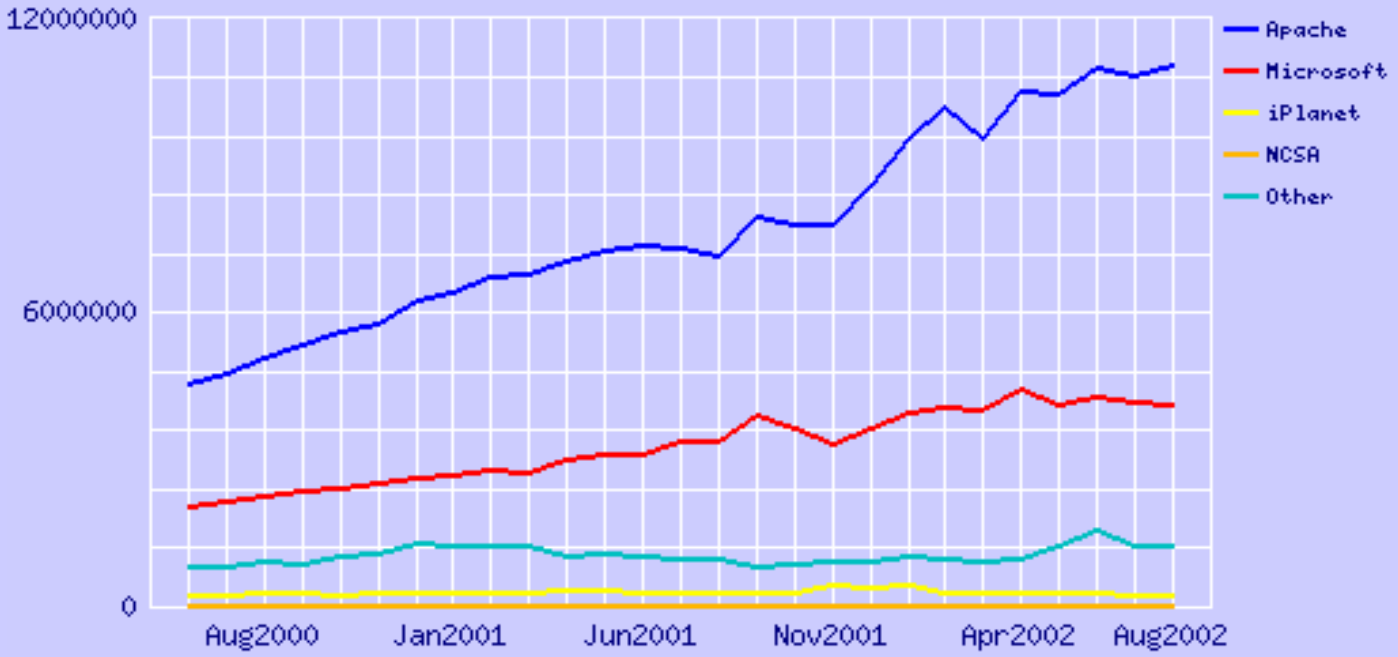
NetCraft - Production Site Usage Survey

http://www.netcraft.com/survey

Active Sites

Developer	July 2002	Percent	August 2002	Percent	Change
Apache	10811987	65.21	11001650	66.64	1.43
Microsoft	4176048	25.19	4074058	24.68	-0.51
iPlanet	214063	1.29	208968	1.27	-0.02
Zeus	183921	1.11	184143	1.12	0.01

Totals for Active Servers Across All Domains June 2000 - August 2002



History of HTTP Servers

- AS/400 shipped its first HTTP server in V3R7
- Product is: 5769-DG1 HTTP Server for iSeries
- Ships with OS/400, but does not come installed
- Based on CERN implementation
- HTTP Server for iSeries (Powered by Apache) debut Dec 15, 2000 on V4R5 via PTF
- Packaged as part of same product
- 2 HTTP servers in one product: Original and Powered by Apache
- They can coexist on the same iSeries system
- Based on Apache 2.0 (alpha version)
- First platform to support Apache 2.0!!

IBM's HTTP Strategy

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- IBM strategic direction is Powered by Apache for all platforms
- IBM funds 4 employees as members of ASF (60 member group)
- Close relationship to ASF (email, BBs, mailing lists, ApacheCon)
- Leverage large Apache install base and development community
- Contributes open source code to ASF

iSeries Plan

- ✓ Port to OS/400 ILE environment
- ✓ Integrate with OS/400 (FS, security, SSL, LDAP, etc)
- ✓ Provide equivalent function to original HTTP Server for iSeries
- ✓ Provide a migration wizard and task oriented GUI administration
- ✓ Maintain currency with Apache V2 and beyond
- ● Eventually replace the original HTTP Server for iSeries

What is Apache?

- Collaborative SW development implementation of HTTP server
- Robust, commercial-grade, full-featured, freely available source code
- Supports HTTP/1.1
- Highly configurable
- Highly extensible with 3rd party modules
- Customizable with user-written modules using Apache API
- Has APR (Application Portable Runtime) to hide platform-specific code
- Version 2.0 is under development (First Beta was 4/4/01)
- Core group encourages large development community (share ideas, bug reports, code fixes)
- Implements frequently requested features

Benefits of Apache over Original

- SKILLS: Students learn Apache in college
  - ➡ Easier for iSeries customers to attract Webmasters
- IMAGE: Recognized industry leader
  - ➡ Easier to justify putting Web server on iSeries
- MAINTAINABILTY: Easier to debug and maintain code (modular structure)
  - ➡ Faster response time for customer/problem resolution
- EASE OF USE: More advanced web-based GUI (wizard driven)
  - ➡ Easier for customers to configure
- FUNCTION: Collaborative code development
  - ➡ More features available quicker
- CUSTOMIZATION: Highly configurable
  - ➡ Highly extendable code base
- QUALITY: Wide user base (for testing/fixing)
  - ➡ Higher quality product

Powered by Apache Features

Functions in iSeries Powered by Apache not in iSeries Original

- Authorization enhancements (denying specific users, groups, etc)
- SSL enhancements and more customization
- Headers control (expires, etc)
- URL rewriting
- Dynamic virtual hosting
- Control over the number of prestart CGI jobs
- More customization of directory listings
- Support for TRCTCPAPP
- Support config files in threadsafe IFS file systems (not just QSYS)
- Reverse proxy
- WebDAV

Powered by Apache Features

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Functions in iSeries Apache not available in Apache on other platforms

- Secure by default
- Browser-based GUI
- Hot-backup
- Extended authentication (LDAP, user profiles, etc)
- Extended SSL/TLS support (client certs assoc. profiles, etc)
- Static and dynamic local file caching
- Extended CGI support (APIs, persistence, named act groups)
- Net.Data support
- Configuration, instance, group APIs
- Search engine and webcrawler support
- Support for TRCTCPAPP and serviceability
- User-defined methods
- Highly available HTTP server

Powered by Apache Features

Functions in iSeries Original not supported in iSeries Apache

- Access log reporting
- Web usage mining
- PICS (Platform for Internet Content Selection)
- Server API => Must convert to Apache modules using Apache API

Support and Compatibility

- "Powered by Apache" is the strategic HTTP server for iSeries
  - PTF's to deliver future betas when available from ASF
  - PTF to deliver future 2.0 GA level when available from ASF
  - iSeries reported problems
    - Low severity problems fixed with a monthly PTF
    - High severity problems fixed as required
- Release to Release compatibility
  - Preserved for CGI and WebSphere applications
  - Not necessarily preserved for Apache modules
- Original HTTP server will continue to be shipped by IBM. No plans have been made at this time to phase out the original server, but that is very likely in the future.

iSeries Scalable Web Serving

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SPECweb99 and SPECweb99 SSL

- www.spec.org
- iSeries numbers published September 3, 2002
- As of September 3, iSeries is first in secure web serving (SPECweb99SSL)
- As of September 3, iSeries is third in non-secure web serving (SPECweb99)
- Numbers achieved with the Apache web server iSeries customers will be using
- Apache Web server: 65% of production Web sites; Zeus: <2% of production Web sites*

Notes:
1. http://www.spec.org/. SPECweb99 is a trademark of the Standard Performance Evaluation Corp. (SPEC).

Apache Software Foundation Tomcat

Tomcat

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- Servlet container that is used in the official reference implementation for the Java Servlet and JavaServer Pages technologies
- Java Servlet and JavaServer Pages specifications are developed by Sun under the Java Community Process
- Developed by the Apache Software Foundation
- Is included with 5722-DG1 as of V4R5
- Mechanism for iSeries users to get started with servlet and JSP applications

The Integrated iSeries HTTP Solution

- Getting started with Apache on other platforms
  - Many platforms require that you download, compile, and build the Apache server
  - User must then also understand the Apache configuration and set up the rules for the operation of Apache server
  - User is solely responsible for the software service and maintenance of the Apache server
- Getting started with Apache on iSeries
  - Apache is built and shipped with the operating system
  - Integrated with OS/400 in areas such as security, file systems (IFS, including QSYS.LIB), serviceability, etc.
  - A graphical interface is provided to assist the user with the configuration of the HTTP server
  - A sample configuration is shipped
  - Fully supported through IBM service

Software Installation

- Use GO LICPGM command to look for the IBM HTTP Server product
  - Option 10 = "Display installed licensed programs"
  - Product in OS/400 version 5 is 5722-DG1 *BASE
  - Product is no-charge
  - Shipped with the media containing OS/400
  - DG1 is now preloaded on all iSeries systems coming off the IBM manufacturing line

Verify Desired Software is Installed

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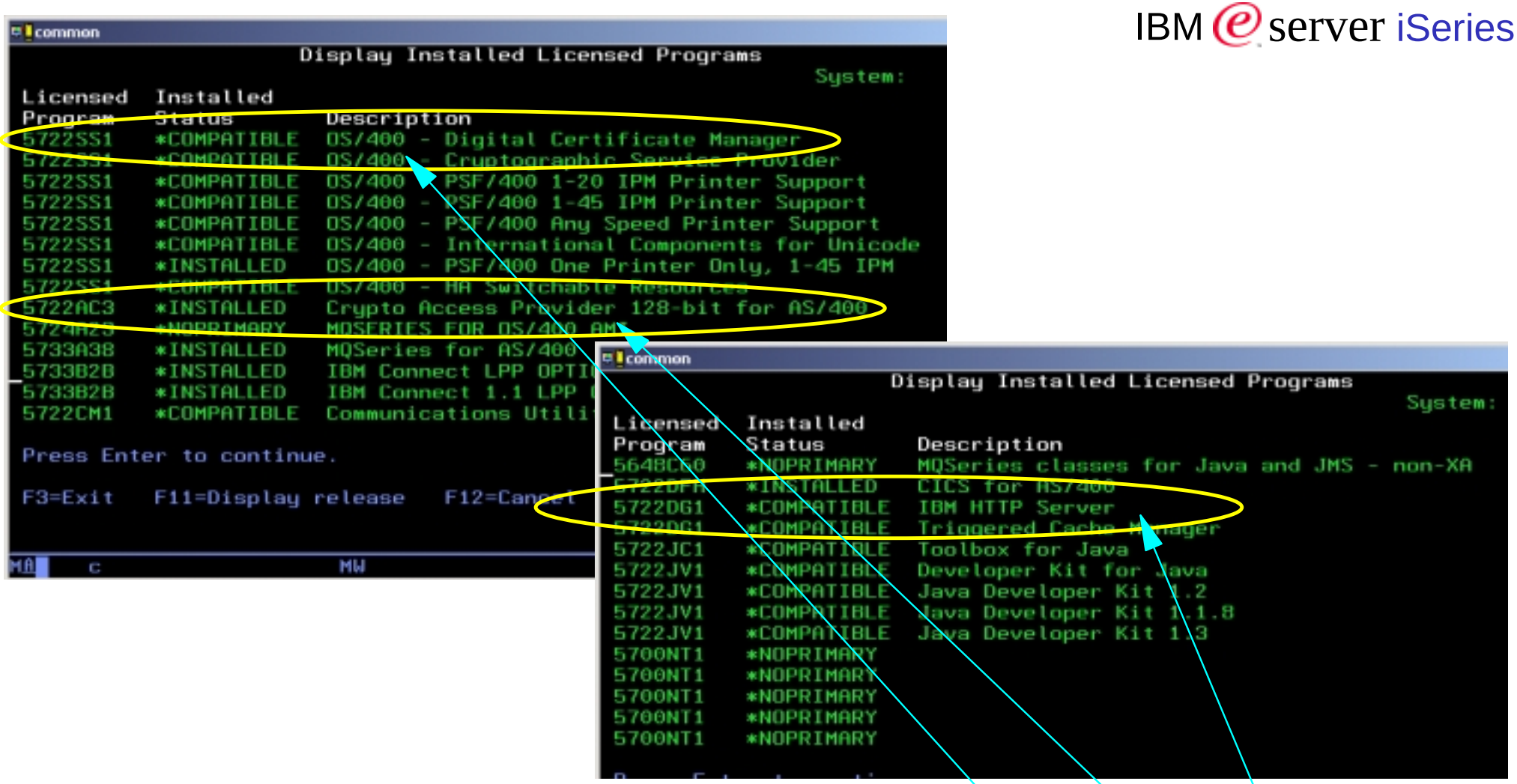


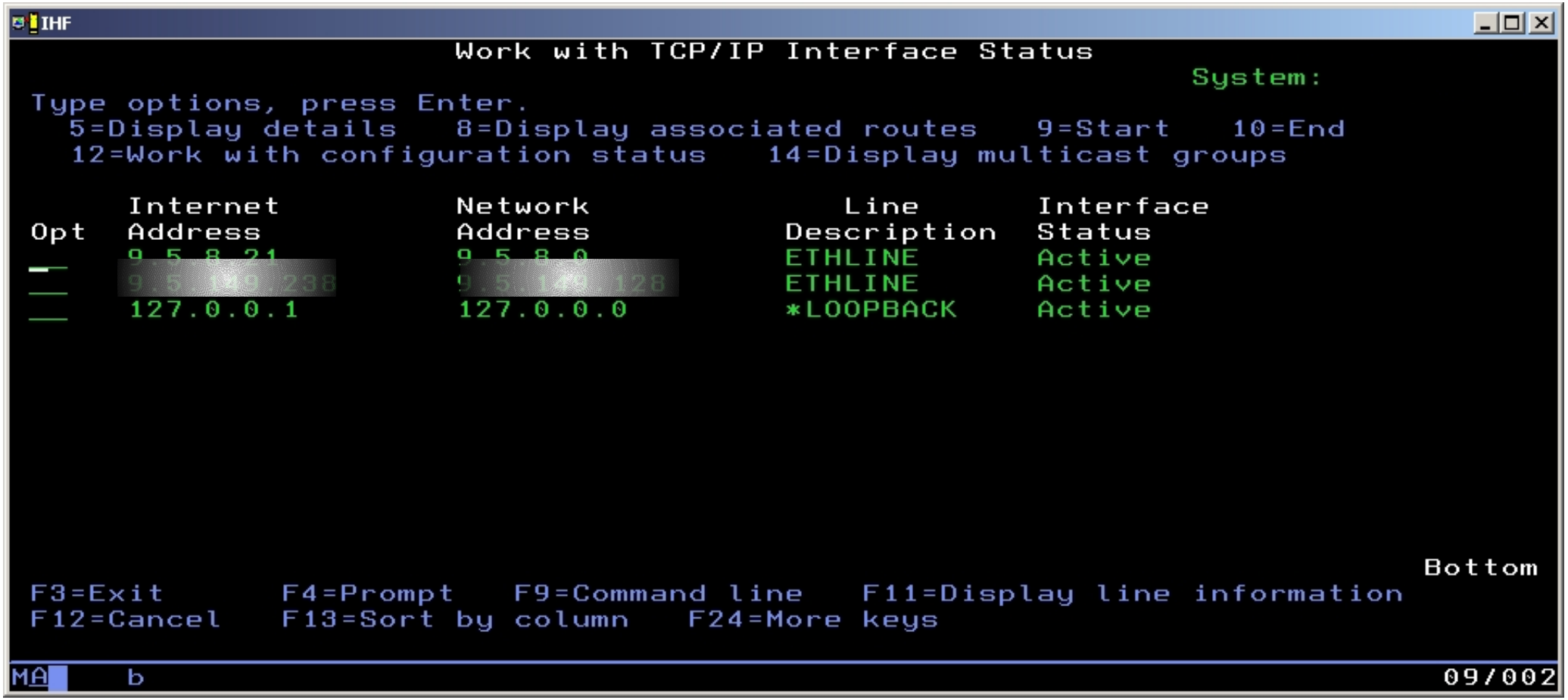
- RSTLICPGM LICPGM(5722DG1) DEV(OPT01) OPTION(*BASE)
- RSTLICPGM LICPGM(5722AC3) DEV(OPT01) OPTION(*BASE)
- RSTLICPGM LICPGM(5722SS1) DEV(OPT01) OPTION(34)

Software Installation

- That's It!
- Other optional software can be installed to extend your HTTP server.
  - Crypto Access Provider 56-bit for iSeries (5722-AC2)
  - Crypto Access Provider 128-bit for iSeries (5722-AC3)
  - Option 34 OS/400 - Digital Certificate Manager option (5722-SS1)
  - IBM Developer Kit for Java
  - IBM WebSphere Application server.
- See the Information Center at
  http://publib.boulder.ibm.com/iseries/v5r1/ic2924/index.htm?info/rzaie/rzaiemain.htm
  - Click on "e-business and web serving"
  - Click on "Web serving"
  - Click on "Install the licensed program:

TCP/IP Requirements

- A TCP/IP interface is required
- CFGTCP



Set up authorities for your WebMaster

- Need a user profile that will be used by your web administrator
  - *IOSYSCFG special authority
    - *CHANGE authority to the library object QUSRSYS
    - *SERVICE special authority if you plan to use the trace TCP application (TRCTCPAPP) function
  - The following file objects require *ALL authority:
    - QUSRSYS/QATMHINSTA
    - QUSRSYS/QATMHINSTC
  - The following command objects require *USE authority:
    - CRTVLDL
    - STRTCPSVR
    - ENDTCPSVR
- A user profile with *ALLOBJ will due, although that's not recommended

Configuration

- Configuration Directives
  - A large set of user-defined instructions stored in a uniquely named file (your configuration file)
  - Used to set most of HTTP server's settings
  - Define rules for the behavior of your HTTP server
  - Example

Display Configuration File

HTTP server: TESTING1
Selected file: /www/testing1/conf/httpd.conf

```
 1 # Configuration originally created by Apache Setup Wizard Tue Sep 25 21:58:14 GMT+00:00 2001
 2 Alias /docs/ /mydir/
 3 Alias /icons/ /www/testing1/icons/
 4 ScriptAlias /cgi-bin/ /qsys.lib/mycgi.lib/
 5 Listen 8101
 6 DocumentRoot /www/testing1/htdocs
 7 DefaultType text/plain
 8 Options +ExecCGI -FollowSymLinks -SymLinksIfOwnerMatch -Includes -IncludesNOEXEC -MultiViews +Indexes
 9 ErrorLog logs/basic_error_log
10 LogLevel warn
11 UseCanonicalName On
12 HostNameLookups off
```

Configuration

Browser-based graphical configuration and administration

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- Enhanced web-based GUI for configuration using ADMIN server
- Simplifies the configuration
- Wizards for creating new servers, serving directories, and migrating original HTTP server configs to Apache
- Web forms for doing specific configuration
- Forms for Apache server management
  - Start/Stop/Restart servers
  - Display status of all servers
- Creates new servers "secure by default"
- APIs are available to monitor servers and update configuration files from a program

Configuration

Starting the Administration Server

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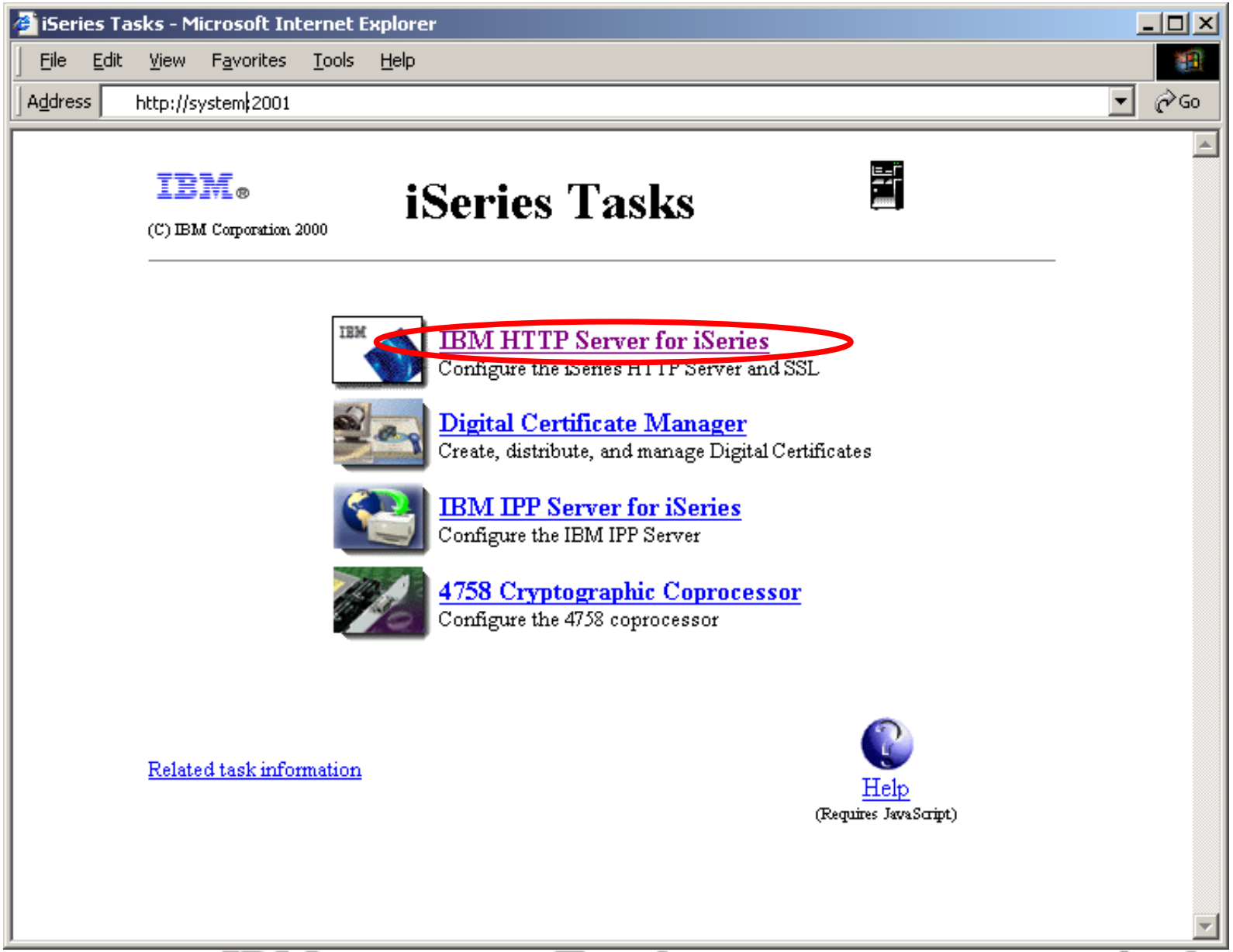
- The Admin server is the server instance that is used to manage your webserver configurations (including the ADMIN server)
- To start the Admin server, you will need to run a CL command
  - STRTCPSVR SERVER(*HTTP) HTTPSVR(*ADMIN)
  - Alternatively use Operations Navigator
- The Admin server "listens" on port 2001 for normal HTTP traffic
- It is "secured" by iSeries profile for all requests
  - Your profile must have *IOSYSCFG special authority to perform configuration activities
- On your browser, enter this url to get the "Tasks" page
  - http://system:2001/

Accessing the Administration Server



This is the iSeries Tasks page

Accessing the Administration Server

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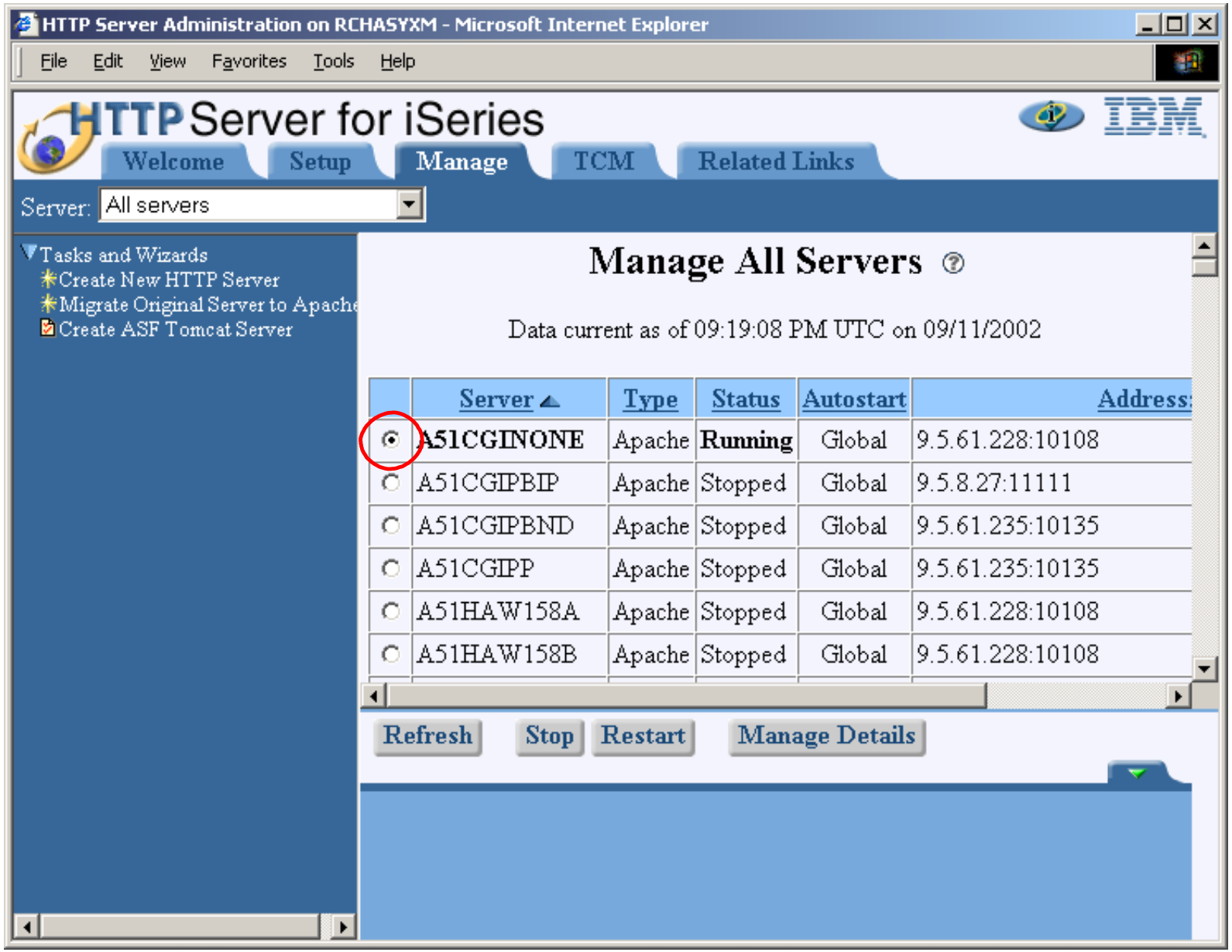
Link to product documentation in Information Center

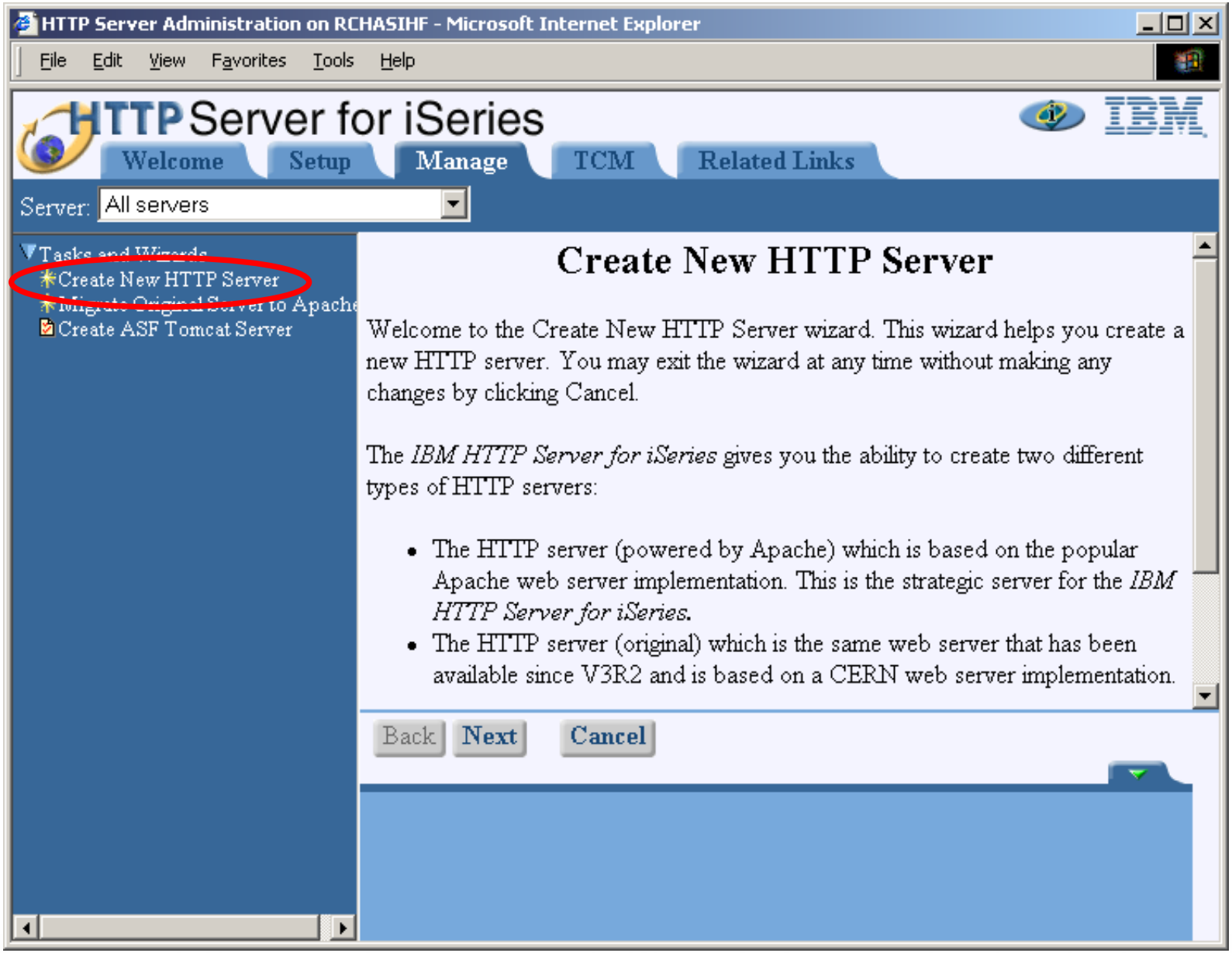
This is the first panel of the configuration and administration forms.

Managing HTTP Servers



- Start
- Stop
- Restart
- Delete
- Rename
- Manage Details

Example of a Wizard



This wizard will take you through a few questions and create a new Apache server for you.

Manage Servers

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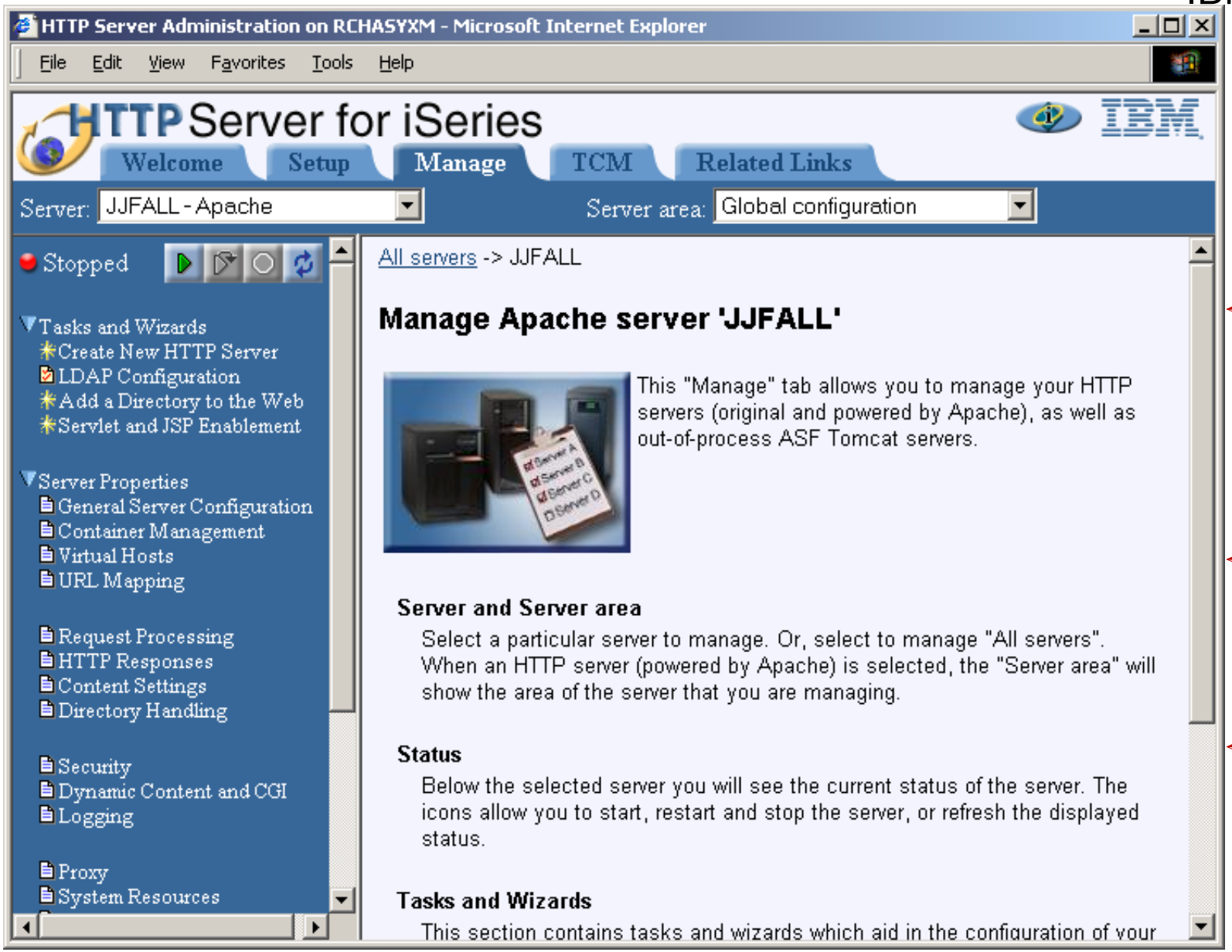

- Mechanism to start and stop
- Links to wizards
- Configuration of server properties

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Example of a Configuration Form

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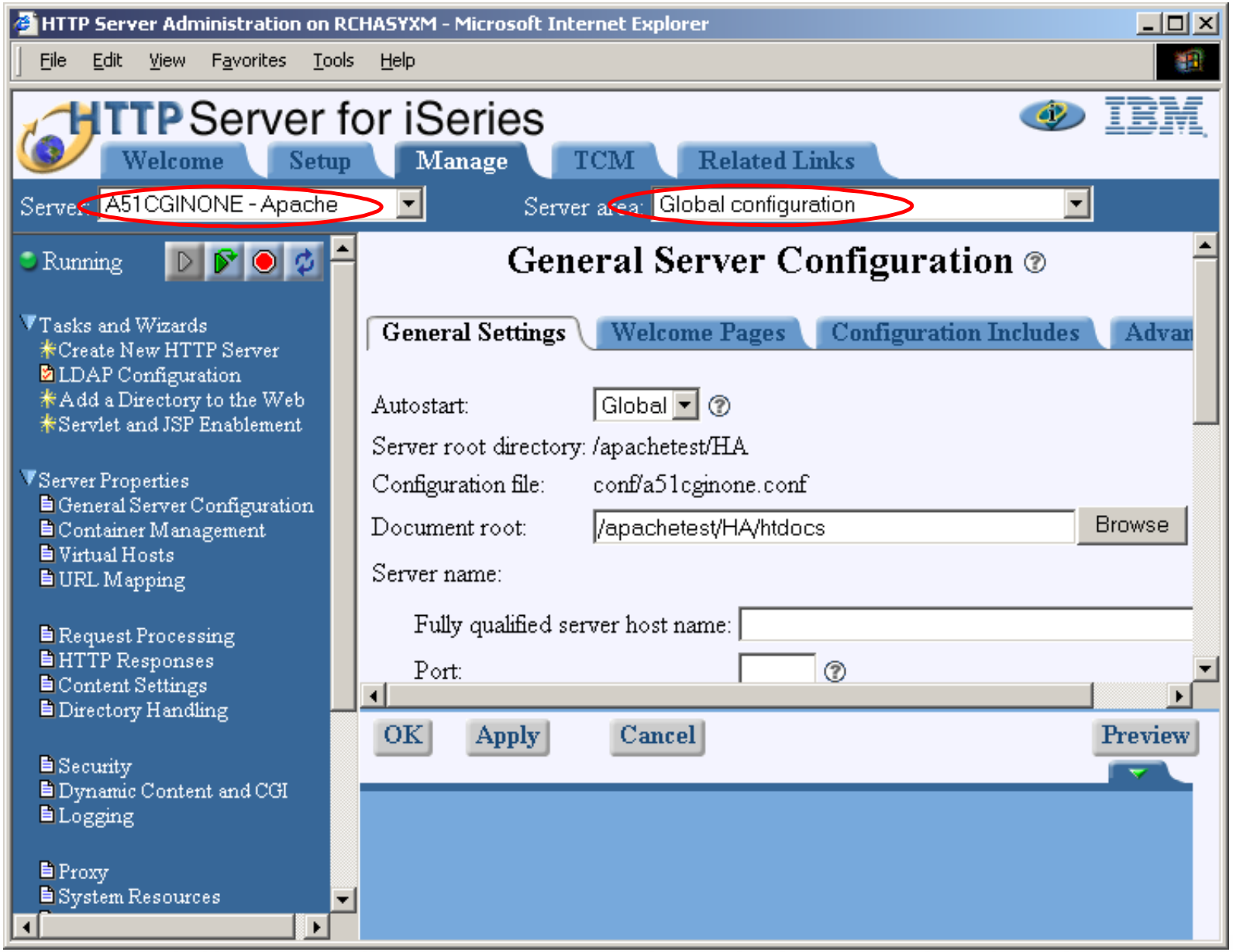

- Help text
- Parameter validation and range checking
- Message area for error information

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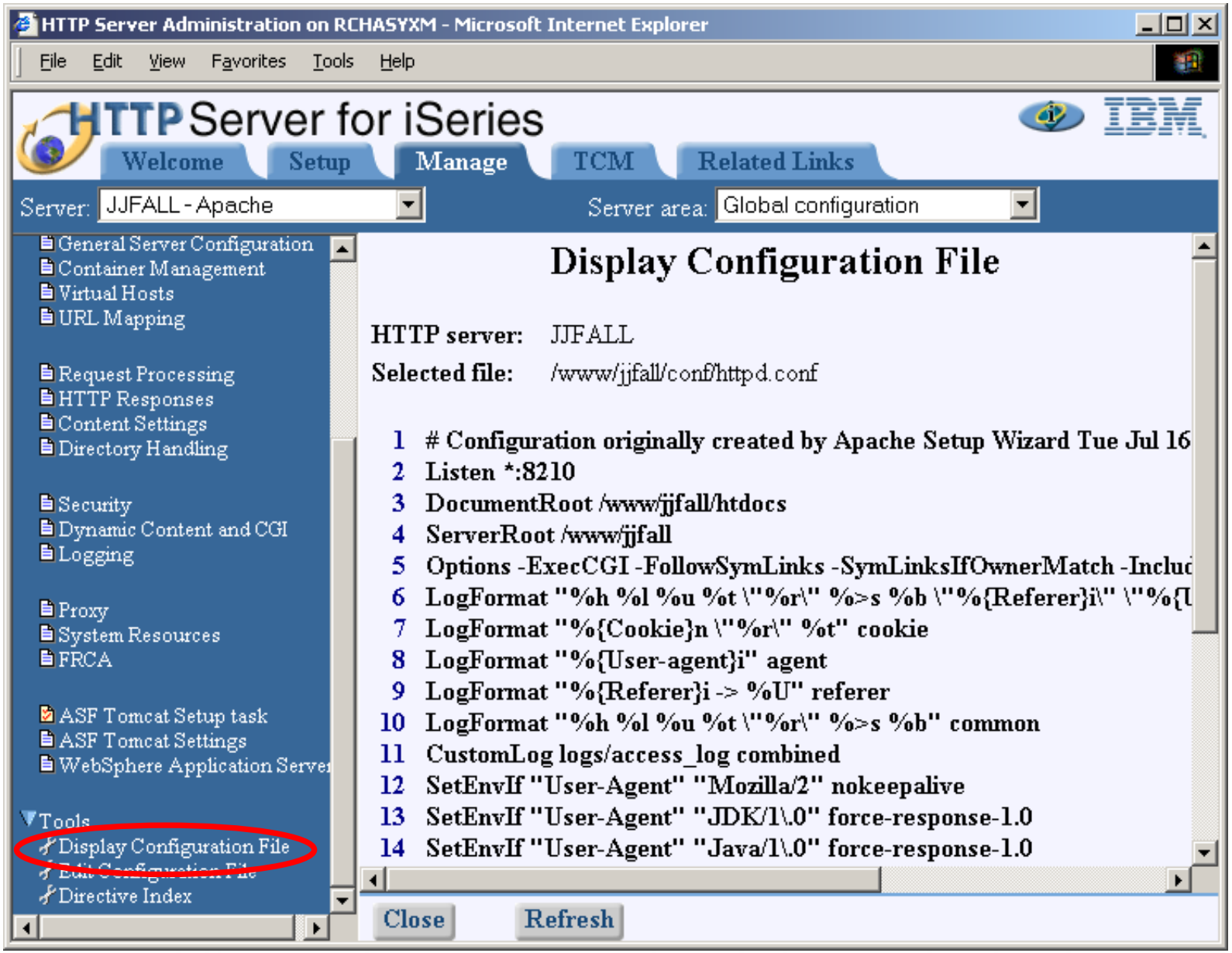
Displaying an Apache configuration



- Graphical interface modifies this file
- Display allows you to see the directives
- Edit option

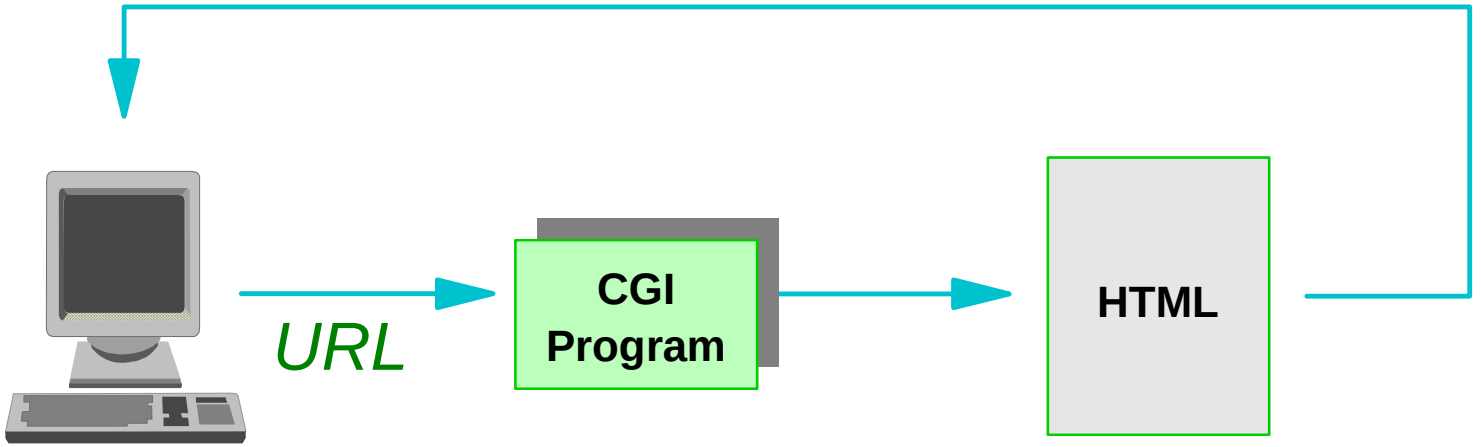
Dynamic Content Support

Common Gateway Interface (CGI) programs

- ASCII/EBCDIC codepage conversions
- Prestart and reuse jobs for CGI
- Multithread-capable CGI support
- Net.Data
- Persistent CGI including Net.Data (state management)
- No parsed header CGI program support
- REXX, C, RPG, COBOL, C++, etc. languages
- Support CGI environment variables

CGI Functional Overview

Invoked by a URL

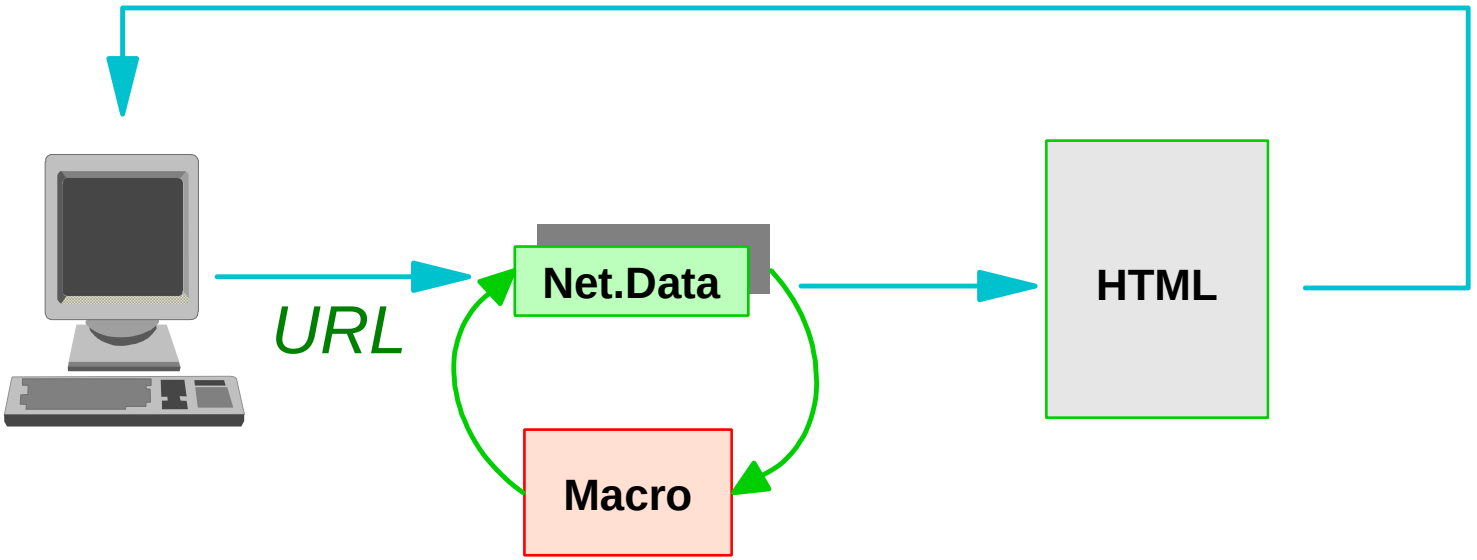


http://your.server.com/cgi-bin/hello.pgm

protocol — *host server name* — *path to CGI programs* — *CGI program*

Net.Data Overview

- Net.Data is a CGI program, named: "db2www"
- Macros consist of macro directives
- Processes macro files -- output is standard HTML



http://server.com/cgi-bin/db2www.pgm/my.macro/input

Net.Data CGI *macro* *macro section name*

Dynamic Web pages Using Net.Data

Net.Data

You create a Macro

```
%Define {
Page_Title = "Joe's home page"
image = "image5.gif"
%}
%HTML (report) {
<html>
<title>$(Page_Title)</title>
<body>
<p>Here is my page.
<img src="$(image)">
</body>
</html>
%}
```

Net.Data

```
<html>
<title>Joe's home page</title>
<body>
<p>Here is my page.
<img src="image5.gif">
</body>
</html>
```

Net.Data IS the CGI program:
It creates the HTML!

- Used for interactive pages
- Format and logic separate (like DDS)
- "Live": pages contain live data

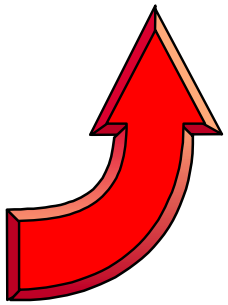
Other Application Support

- IBM WebSphere Application Server
  - Java servlets
  - Java Server Pages (JSPs)
  - Only support Apache with version 3.5 or greater
  - Apache plug-in module available
    - ➡ Delivered in a separate PTF to 5733AS3 and 5733WA3
    - ➡ Details: www.ibm.com/eserver/iseries/software/websphere
- Domino will support Apache in a future release
- Additional HTTP server features
  - Apache API (modules)
  - Server-side includes (SSI)
  - User-defined method support
  - WebDAV collaborative web development

Server Side Includes

- **Server commands imbedded within HTML documents and CGI output**
- **Dynamic information is inserted**
- **Most common types:**
  - current date
  - size of file
  - date of the last change to the file

```
<HTML>
<!--#include file="/QIBM/UserData/path/Title.html" -->
<BODY>
Date last changed:<br>
<!--#config timefmt="%T %D" -->
<!--#global var="PARENT_URI" value=&DOCUMENT_URI; -->
<!--#flastmod virtual=&PARENT_URI; -->
<p>This is my document.
</BODY>
<!--#include file="/QIBM/UserData/path/Footer.html" -->
</HTML>
```

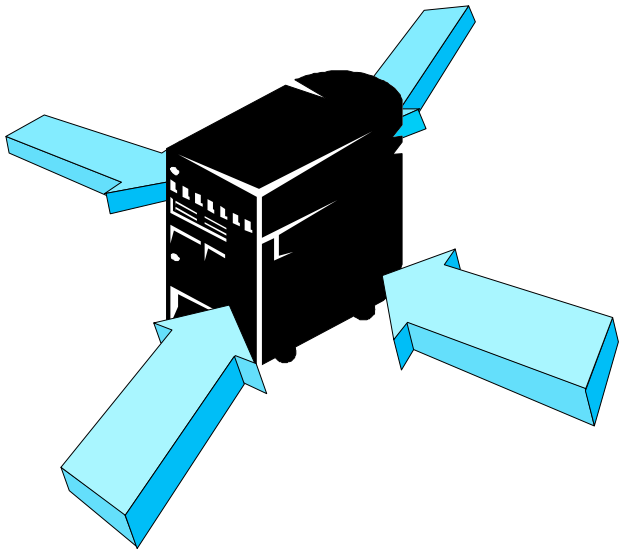


```
My Website Title

Date last changed:
06/28/98 07:58:02
This is my document.

My Corporate Footer
```

(as viewed from browser)

Hosting Multiple Web Sites

- Also known as Virtual Hosting
- Multiple HTTP servers on a single iSeries
  - Multiple instances
  - Each instance runs separate jobs/processes
- Supports Multiple IP addresses
  - Use a single instance
  - Or use multiple instances
- Supports Multiple Host names
  - System has multiple host names which all resolve to the same IP address.
  - A single instance can determine which name was used in the URL and handle it accordingly (HTTP 1.1)
- Dynamic Virtual Hosting



iSeries Security

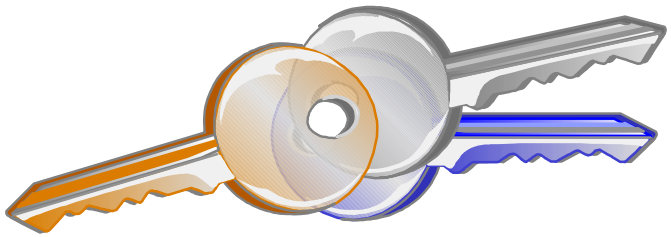
- Server runs under authority of default iSeries user profile
  - QTMHHTTP for file serving
  - QTMHHTP1 for CGI application processing
- Adheres to iSeries object security
  - Server swaps to the user profile to process the request
- Servers are secure by default on install
- Setup Internet User groups for access control

Authentication Options

- HTTP Basic Authentication
  - "Intranet Users" using iSeries user profiles
  - "Internet Users" using Validation Lists or LDAP directories to store user authentication information
  - User Profile swap to serve requests
- Requester IP address template protection
  - Not recommended, IP addresses can be "spoofed" easily
- SSL Client Authentication (digital certificates)
  - Valid certificates
  - Certificates with certain "DN" characteristics
  - Associate client certificates with iSeries user profiles
  - Associate client certificates with Validation Lists entries
- No message digest authentication (MD5) on iSeries

https: Encrypted Communication Capabilities

- Secure HTTP: HTTP communication between browser & server is encrypted.
  - When privacy is required!
  - Invoked with https:// protocol in URL
  - Optional Client authentication
  - Required Client authentication
  - SSL Versions 2 and 3, and TLS
- Needs a digital "Server" certificate
- Requires Cryptographic Services on the iSeries
  - (5722AC1, 5722AC2, or 5722AC3)
- Supported by iSeries - Digital Certificate Manager
  - (5722SS1 option 34)



User Authentication Services (1st tier)

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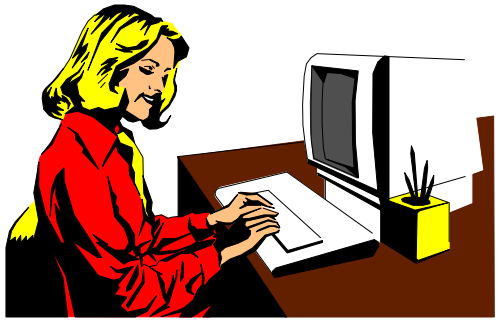
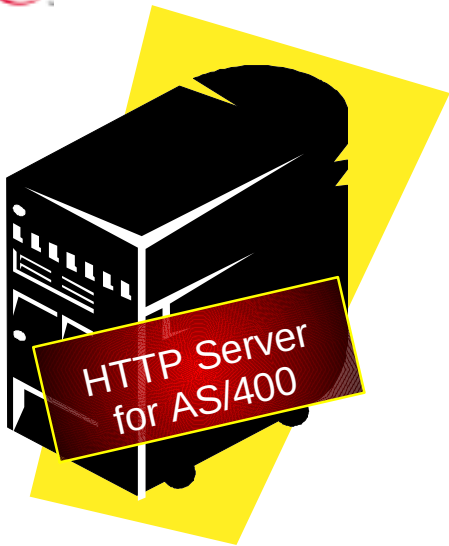
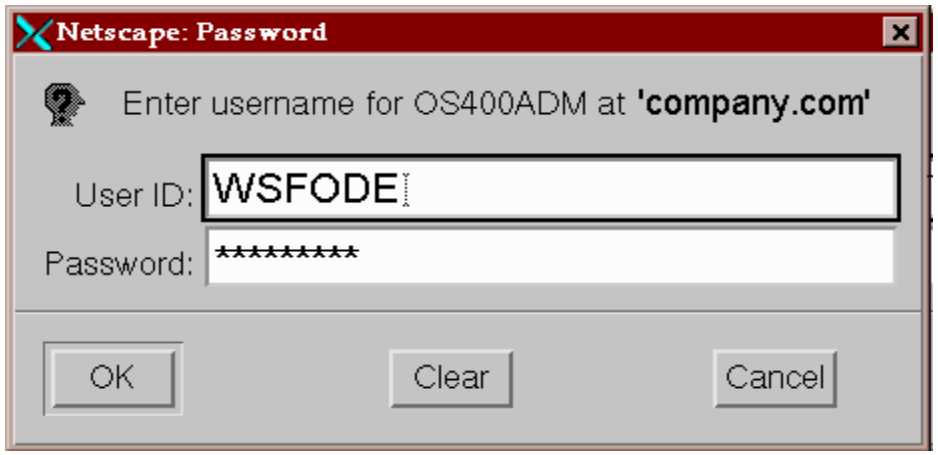


1 http://company.com/private/page.html

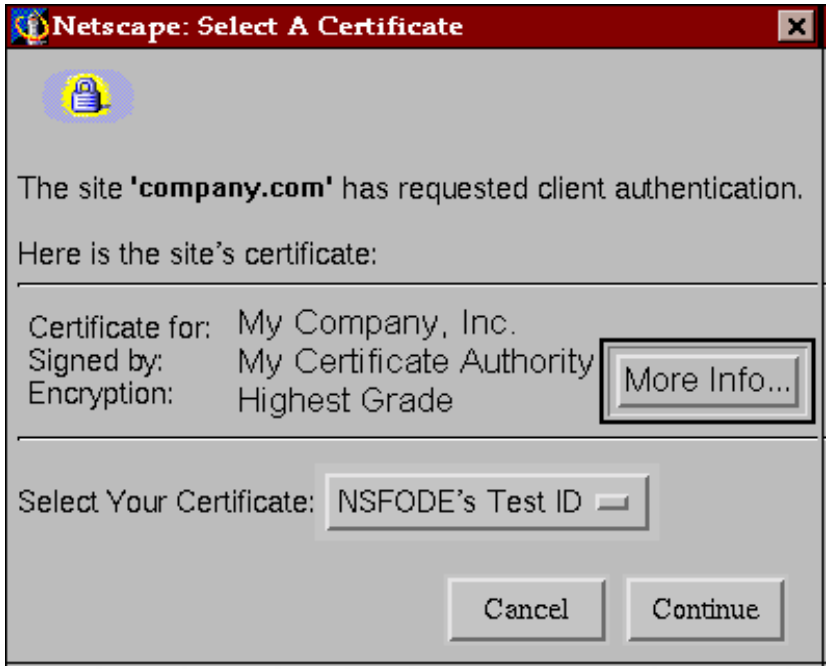
2 Not Authorized (Error 401)

3 URL + User Name/Password
or URL + Client Certificate





or



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Logging Capabilities

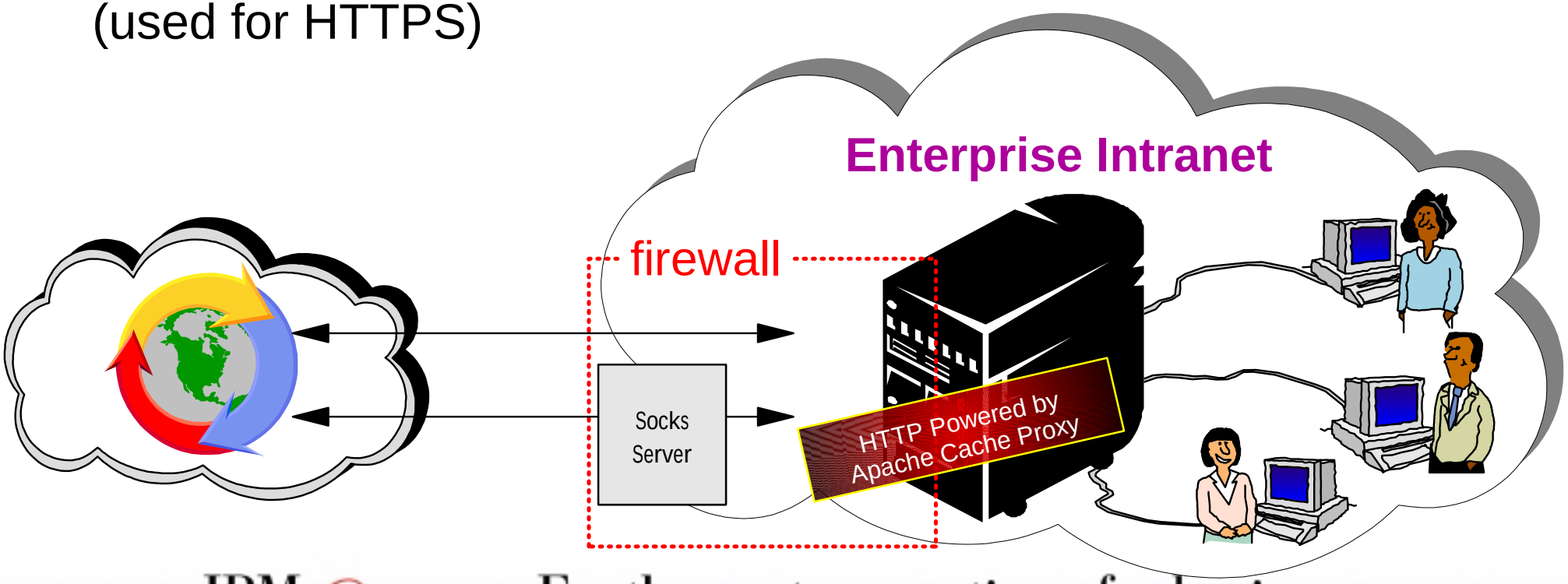
- Informational - Access Log
  - Customizable to achieve an Agent, or Referrer log
    - Agent - which browser(s) are being used
    - Referrer - what link or page brought them to your site
  - Combined log format - include Agent and Referrer info in the Access Log
  - Compatible with log analyzers
  - Can be used to monitor who is using the web site
- Error Log - Web site errors
  - Find errors in Web pages & applications
  - CGI errors in error log or can be separate
- Log formats - Common, extended, user-defined
- Configuration of a cookie log allows user tracking based on cookies
- Future capabilities include configurable log rollover and maintenance

Caching Proxy Server Capabilities

- Retrieves documents on behalf of clients
- Caches documents
- Can be directed through enterprise Socks server
- Supports SSL Tunneling (used for HTTPS)

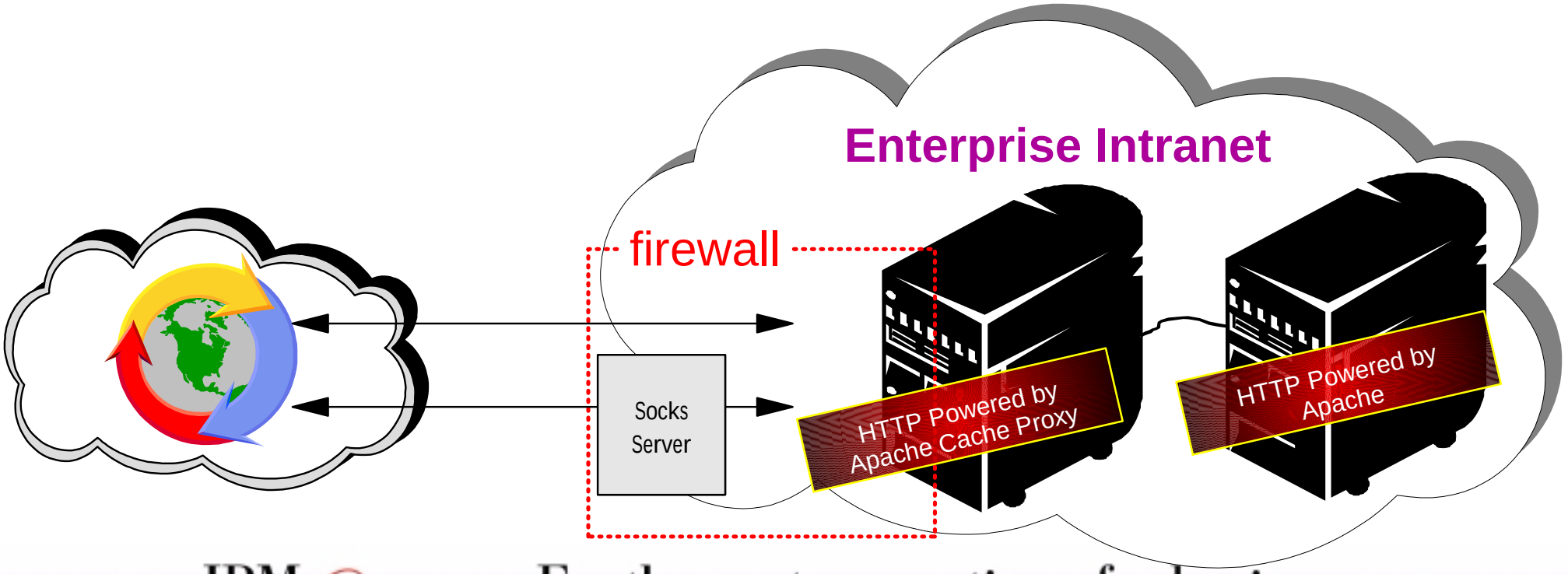
Benefits:

- ➡ Separate IP infrastructure for internal networks
- ➡ Reduce network traffic
- ➡ Securable Internet access
- ➡ Logs activity



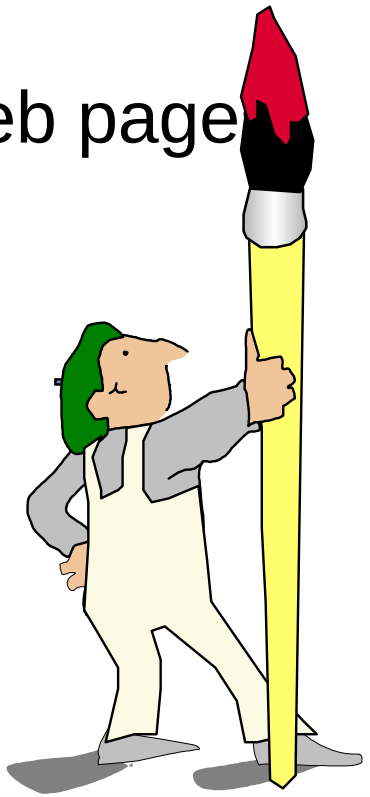
Reverse Proxy Server Capabilities

- Caches documents on behalf of your "content server"
- Can be directed through enterprise Socks server
- Supports SSL Tunneling (used for HTTPS)
- Serves as both a proxy server and reverse proxy server at the same time
- Relieve static page workload off your content server



Other Customization Options

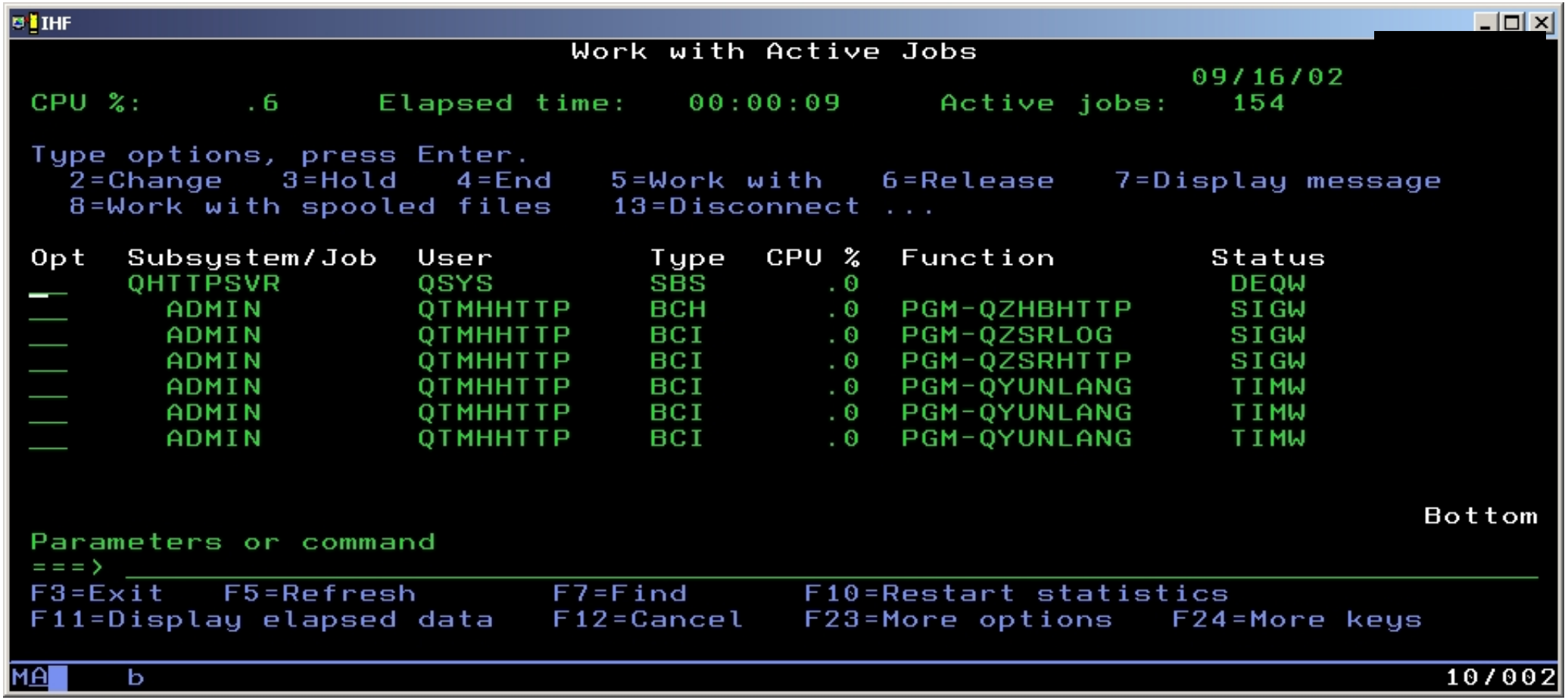
- Meta Information files
- Directory listings
- User directories
- Custom error messages
- Configure for multiple Welcome Pages
- Use Automatic Browser Detection for serving web pages tailored to a particular browser
- Image maps
- User tracking



Job characteristics

IBM @server iSeries

- Runs in QHTTPSVR subsystems
- One "parent" server job
- Two "child" server jobs
- Multiple "helper" jobs



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Apache Concepts

Server root: The base directory where server files (config, logs) are stored.

Document root: The base directory containing Web content files.

Module: A separately loadable server function. It identifies a set of valid directives to configure the function. Ex. SSL, LDAP.

Configuration file: Where a server's configuration is stored. It contains directive values.

Directives: A predefined list of names used to configure the server. Each directive allows one more more values to be specified.

NOTE: The admin/config GUI creates and updates these files based on features you choose to enable using the GUI.

What Requires Migration

Migration from Original to Powered by Apache

IBM @server iSeries

No migration needed for:

- CGI programs and WebSphere applications
- Web site content
- Users, validation lists and group files

Migration required for:

- Original HTTP server configurations are migrated by the wizard
- Server API programs need to be rewritten as Apache modules

How do I migrate an original configuration?

- IBM provides a migration wizard
- Wizard can be accessed through the configuration GUI
- Wizard does not destroy original server configuration
- Most directives migrate cleanly
- Wizard will migrate most directives, but in some cases is not able to migrate directives. It tells you what things were not handled in a summary report
- Testing the resultant Apache configuration is important

New Features in V5R2 (and soon V5R1)

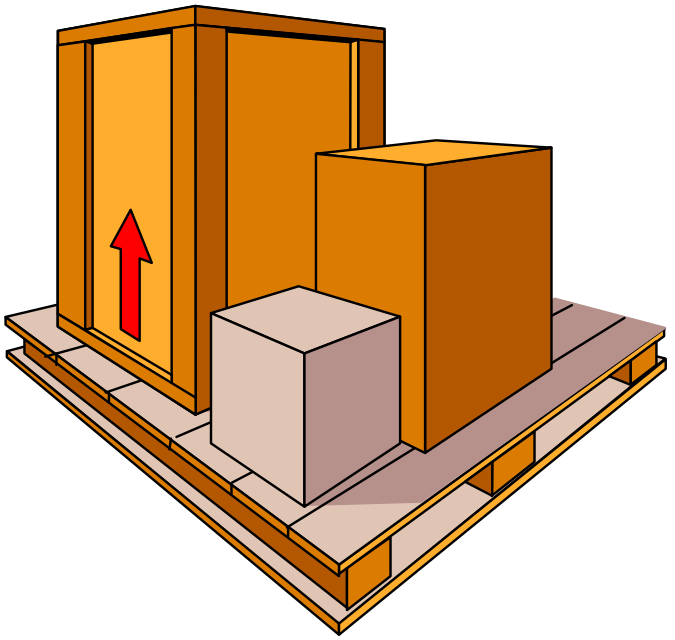
Apache 2.0.39 (Generally Available) version

IBM @server iSeries

- Fast Response Cache Accelerator (FRCA)
- Highly available HTTP server
- Log rollover and archival
- Logging to QSYS files
- TLS upgrade
- GUI enhancements (usability/accessibility/wizards)
- Support for PASE CGI
- Full function migration wizard
- Supported by Domino 6
- Improved HTTP server management capabilities (server statistics to collection services)

Product Packaging

- IBM HTTP Server for iSeries (Powered by Apache)
  - V5R1: In the base for 5722-DG1
- IBM HTTP Server for iSeries Triggered Cache Manager
  - V5R1: Option 1 for product 5722-DG1
- IBM WebSphere Application Server
  - WebSphere Apache Module
  - PTF to product 5733AS3 and 5733WA3
- Crypto Access Provider (SSL support)
  - 5722-AC1 (40-bit)
  - 5722-AC2 (56-bit)
  - 5722-AC3 (128-bit)
- iSeries - Digital Certificate Manager
  - 5722-SS1 option 34



Documentation/Resources

Web Sites

- IBM iSeries HTTP Server
  - www.ibm.com/eserver/iseries/software/http
  - Apache info, PTFs, V5R1, getting started, documentation
- Apache
  - www.apache.org
  - www.apachetoday.com
  - www.apacheweek.com

Books

- Configuring and managing Apache servers (not platform specific).

iSeries & WebSphere Resources & Deliverables

iSeries site
www.iseries.ibm.com/

iSeries WebSphere Application Server
http://www-1.ibm.com/servers/eserver/iseries/software/websphere/wsappserver/

PartnerWorld for Developers, iSeries & WebSphere
http://www.iseries.ibm.com/developer/websphere/

IBM eServer Solutions
http://www-1.ibm.com/servers/eserver/iseries/solutions/

iSeries e-business Solutions
http://www-1.ibm.com/servers/eserver/iseries/ebusiness/

iSeries B2B Solutions
http://www-1.ibm.com/servers/eserver/iseries/btob/

Connect for iSeries
http://www-1.ibm.com/servers/eserver/iseries/btob/connect/v11high.html

WebSphere Commerce Suite for iSeries
http://www-1.ibm.com/servers/eserver/iseries/ebusiness/wcs51.html

iSeries and e-commerce
http://www-1.ibm.com/servers/eserver/iseries/ebusiness/ecommerce.htm

iSeries HTTP Server
http://www-1.ibm.com/servers/eserver/iseries/software/http/index.html

WebSphere Development Studio for iSeries
http://www-3.ibm.com/software/ad/wds400/

iSeries and WebSphere References
http://www.as400.ibm.com/developer/java/solutions/jjem.html
http://www2.software.ibm.com/casestudies/swcsweb.nsf/platform

iSeries Solution Finder
http://www.iseries.ibm.com/btobpartner/

iSeries & Domino
http://www-1.ibm.com/servers/eserver/iseries/domino/

Dedicated Server for Domino
http://www-1.ibm.com/servers/eserver/iseries/domino/dsd.htm

Workload Estimator for iSeries, WAS, WCS & Domino, HTTP Server, Java, etc.
http://as400service.ibm.com/estimator/

iSeries Custom Technology Center
http://www-1.ibm.com/servers/eserver/iseries/service/ctc/

iSeries Technical Support
http://as400service.ibm.com/

iSeries Technical Studio
http://www.as400.ibm.com/tstudio/

1st Install for iSeries & WebSphere Application Server
http://www.iseries.ibm.com/developer/websphere/assistance.html

iSeries ToolsNet (Tools & Middleware)
http://www.iseries.ibm.com/developer/tools/

iSeries & Services Network
http://as400service.ibm.com/supporthome.nsf/document/19251245

iSeries e-business Handbook (SG24-5694-01)
http://www.redbooks.ibm.com/abstracts/sg245694.html

WebSphere Commerce Suite With Back-End Order Mgmt.
http://ibm.com/redbooks

iSeries Technology Center
http://www.iseries.ibm.com/service/itc/ebiz.htm

iSeries University
http://www-3.ibm.com/services/learning/community/as400/

iSeries & WebSphere Resources & Deliverables

WebSphere Application Server Overview
http://www-4.ibm.com/software/webservers/appserv/

WebSphere Commerce Suite
www-4.ibm.com/software/webservers/commerce/

WebSphere Payment Manager
www-4.ibm.com/software/webservers/paymgr/

MQSeries
www.ibm.com/software/ts/mqseries

iSeries & WebSphere Documentation

Redbooks & Red Pieces	Form Numbers/Web Sites
Building iSeries Applications for WebSphere Advanced Edition	SG24-5691
Building Java Applications for the iSeries with VisualAge for Java	SG24-6245
Integrating WCS with Domino Back-End Applications	
· http://ibm.com/redbooks (search for REDP0141)	

Java & WebSphere Performance on iSeries
- **http://publib-b.boulder.ibm.com/Redbooks.nsf/RedpieceAbstracts/sg246256.html?Open**

iSeries Application Development Directions white paper is now available
- **http://www.iseries.ibm.com/developer/tools/documents/addir/index.html**

Connect for iSeries with WebSphere Commerce Suite Red Paper
- **http://www.redbooks.ibm.com/redpapers/pdfs/redp0127.pdf**

Tools for Application Reface and Redesign
- **http://www.as400.ibm.com/developer/comm/pidtechpapers.html?Tools**

Introduction to Enterprise JavaBeans for AS/400	SG24-5192-00
Web enabling AS/400 Applications with WebSphere Studio	SG24-5634-00
Building AS/400 Applications with WebSphere Standard Edition 2.0	SG24-5635-00
Building AS/400 C/S Apps with Java	SG24-2152-02
Building AS/400 Internet-based applications with Java	SG24-5337-00

IBM Redbooks
http://www.redbooks.ibm.com/

iSeries Nation
http://www-1.ibm.com/servers/eserver/iseries/announce/form.html

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Notes: