Web Serving on VM/ESA with VM:Webgateway

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Agenda

- Web server basics
- Web servers on VM/ESA
- CA's VM:Webgateway

Web Server Basics

- TCP/IP application, by default on port 80
  - On port 443 with Secure Sockets Layer (SSL)
- Provide web-browser access via HyperText Transport Protocol (HTTP) to
  - Data files ("static content")
  - Program output ("dynamic content")
  - Programs ("active content")

Web Server Basics

- Provide "server" and "user" pages
  - Server from some configured file tree
  - User via "tilde hack" (*e.g.* "http://www.redneck.com/~bubba/deer_spotlighting.html")

Web Servers on VM/ESA

- Five native VM web servers last time I counted
  - Rick Troth got us all interested with Webshare
  - All others are commercial
- Most provide at least CMS static files
- Most support Rexx programs
- Some have richer menus
- Some are single-purpose to front-end specific 4GLs

VM:Webgateway Facilities

- Static files
- Program output
- Application enablement
- Configuration support

Static Files

- Supports all CMS files
  - Minidisks (EDF and CDF) files
  - Shared File System (SFS)
  - POSIX files (BFS)
- Simulates hierarchical file system on minidisks (“DIRMAP” files)
  - Necessary for some non-hierarchical functions too
  - Supported for SFS and BFS as well
- Server Side Includes (SSI) can modify content somewhat

Static Files

- File characteristics determined by filetype
- Can "filter" files through CMS Pipelines stages

Program Output

- Program type and environment determined by filetype
- Common Gateway Interface (CGI) programs in Rexx
  - "CGI" command interface
  - On the web server userid (privileged environment)
  - On worker machines (unprivileged)
- CGI programs as CMS Pipelines stages
  - On the web server userid (compatible with Webshare)
  - On worker machines

Program Output

- Java servlets on worker machines
  - New in VM: Webgateway 3.2

Rexx CGI Programs

- No limit on number of simultaneous programs
- Any kind of CMS file (minidisk, SFS, BFS)
- Run either on server or workers, same programming interface
- CGIGETVAR …
  - Obtain CGI environment variables
  - Output to Rexx variables

Rexx CGI Programs

- CGIREAD …
  - Read data from web browser
  - Optional translation between ASCII (browser) and EBCDIC (VM) character sets
  - Optional "read until" string
  - Output to Rexx variables or program stack
- CGIURLDECODE …
  - Decode HTML form results
  - Output to Rexx variables
  - Not as simple as you'd think - some very strange artifacts

Rexx CGI Programs

- **CGIEMSG …**
  - Write a error message to the web server console
    - Because SAY won't cut it on worker machines
  - Input from Rexx variables or command arguments
- **CGILOG …**
  - Write a message to the web server log
    - Because SAY won't cut it on worker machines
  - Input from Rexx variables or command arguments

Rexx CGI Programs

- CGIWRITE ...
  - Send control information and data to web browser
  - Optional translation between ASCII (browser) and EBCDIC (VM) character sets
  - Input from Rexx variables, or command arguments

Pipelines CGI Programs

- Only one program at a time (dictated by Webshare compatibility concerns)
- Minidisk or SFS directory is ACCESSed for duration (not from BFS as a result)
- Primary input stream provides data from web browser, translated from ASCII to EBCDIC
- Secondary input stream provides HTML form results, translated from ASCII to EBCDIC

Pipelines CGI Programs

- Primary output stream sends data to web browser, optionally translated from EBCDIC to ASCII

Java Servlets

- Builds on IBM's CMS Java support
- Fully compatible with Sun's Java Servlet Specification 2.1
- Servlets run on worker machines
  - Can be stored in any CMS file (minidisk, SFS, BFS)
- Uses a modified Apache servlet engine
  - Upgraded from 2.0 to 2.1
- Should run any pure-Java 2.1 servlet unchanged
  - Not even recompiled - use class and JAR files

Application Enablement

- CGI programming extensions on web server userid
- 3270 session scripting via logical devices (LDEVs)
  - "VIG SESSION" command interface
- Line-mode CMS application scripting
  - "VIG USER" command interface
- Canned building blocks for Rexx
  - VIGRTNS external subroutine
- VSE CICS CGI programs via Data 21's IP Server product

3270 Session Scripting

- VIG SESSION CREATE MODEL ***modelnumber [EXTENDED]***
  - Define a new 3270 LDEV and connect to it
- VIG SESSION CONNECT ***handle***
  - Connect CGI program to existing LDEV
- VIG SESSION ACTION …
  - Define automatic actions based on field contents
  - Handy way for deal with CP “MORE…” and “HOLDING”
- VIG SESSION FIELD ***fieldnumber data …***
  - “Type” data into a screen field

3270 Session Scripting

- VIG SESSION PRESS ***keyname***
  - "Press" ENTER, CLEAR, PA*n*, PF*n*
- VIG SESSION WAIT [FOR]
  - Wait for screen updates
- VIG SESSION TRACE …
  - Control session debug tracing
- VIG SESSION DETACH
  - Release LDEV for next CGI to use
- VIG SESSION DESTROY
  - Terminate LDEV

3270 Session Scripting

- Results returned in Rexx variables
  - RC
    - Command return code
  - VIG_SESSION_BUFFER
    - Enter screen as one continuous string
  - VIG_SESSION_CURSOR
    - Screen cursor location
  - VIG_SESSION_FIELD.*n*
    - Screen field *n*, VIG_SESSION_FIELD.0 is field count
  - VIG_SESSION_HANDLE
    - Current screen-state handle (for next VIG SESSION CONNECT)

3270 Session Scripting

- VIG_SESSION_INFO
  - LDEV characteristics
- VIG_SESSION_LINE.*n*
  - Output line *n*, VIG_SESSION_LINE.0 is line count
- VIG_SESSION_MESSAGE
  - Last VIG SESSION message issued

Line-mode CMS Scripting

- VIGUSER INIT ***web_server_userid …***
  - Allow connections from specified web server userids
  - Typically done in SYSPROF EXEC
- VIG USER CONNECT [***handle***]
  - Connect CGI program to user's CMS userid
- VIG USER ENTER ***text***
  - Send a command to execute
  - Feed input to interactive commands
- VIG USER ABEND ***userid abend_code***
  - For those times when nothing else will do

Line-mode CMS Scripting

- Results returned in Rexx variables
  - RC
    - Command return code
  - VIG_USER_HANDLE
    - Handle for next VIG USER CONNECT
  - VIG_USER_MESSAGE
    - Last VIG USER message issued
  - VIG_USER_OUTPUT.*n*
    - Output line *n*, VIG_USER_OUTPUT.0 is line count
  - VIG_USER_RETCODE
    - Return code from command, set when command ends

Rexx Building Blocks

- Call VIGRTNS “***name arguments ...***”
- Results returned in Rexx variables
  - RESULT
    - Routine return code
  - VIGRTNS_MESSAGE
    - Last VIGRTNS message issued
  - VIGRTNS_RESULT
    - Result of routine

Rexx Building Blocks

- Call VIGRTNS “DIAL ***userid vaddr***”
  - Connects an LDEV to the specified host userid
- Call VIGRTNS “DIALVTAM ***[VTAMuserid]***, application_name,***[VTAMlogmode]***”
  - Connects an LDEV to VTAM and logs on to a VTAM application
- Call VIGRTNS “HTMLSAFE ***text***”
  - Makes *text* safe for inclusion in HTML (no exposed “<“, “&”, *etc.*)
  - Returns safe text

Rexx Building Blocks

- Call VIGRTNS “ICCFLOGON ***userid password, [command]***”
  - Connects an LDEV to a VSE ICCF session
- Call VIGRTNS “SUBSTITUTE CMS ***filename filetype [filemode]***”
  - Processes an HTML file, merging in Rexx variable contents
    - e.g. “<b>Hi Doctor VIG:VAR(UsersFirstName)!</b>” might yield “<b>Hi Doctor Nick!</b>”
  - Returns full HTML as a single string

Rexx Building Blocks

- Call VIGRTNS “USERPASS ***[realm]***”
  - Checks if user supplied a userid and password
  - Generates “401 Not Authorized” HTTP error if not
  - Returns HTTP “Authorization:” header value (in clear-text)
- Call VIGRTNS “VMLOGON ***userid password, [logon_parms, [system], [command]***”
  - Logs an LDEV on to VM and issues the specified command
  - Handles errors, CP LOGMSGs, *etc.*

Rexx Building Blocks

- Call VIGRTNS “VTAM LOGON ***application [logmode]***”
  - Connects an LDEV to VTAM and logs on to a VTAM application
- Call VIGRTNS “WEBENALBL ***[many_control_options]***”
  - Delivers a 3270 screen to the browser
- Call VIGRTNS “64DECODE ***string***”
  - Decode a BASE64-encoded string (*e.g.* MIME binary data)

Rexx Building Blocks

- Call VIGRTNS "64ENCODE *string*"
  - Encode a string in BASE64 form

Configuration Support

- All changes are stored and loaded during future startup
- Line-mode commands from server console or authorized userid
  - Single-valued "things"
    - CONFIG *thing value* (*e.g.* "CONFIG USERPAGES OFF")
    - QUERY *thing* (*e.g.* "QUERY USERPAGES")

Configuration Support

- Multiple-valued "things"
  - CONFIG *thing* ADD|DELETE|REPLACE *arguments* (*e.g.* "CONFIG SYSADMIN ADD BUBBA")
  - QUERY *thing selections* (*e.g.* "QUERY SYSADMIN *")
- The whole enchilada
  - QUERY CONFIG

Configuration Support

- Web browser HTML pages with appropriate authorization
  - http://vm.host.com/VM:Webgateway/Menu.html
  - Responses as HTML
  - Based internally on line-mode commands
  - Lots of hyper-linked help information
    - Including error message documentation