WAVV 2004 Conference

CICS Web Support:
Access to CICS Applications from the Web

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Agenda

- What is CICS Web Support?
- CICS Web Support architecture
- Enabling CICS Web Support
- Writing CICS Web Applications
- Running 3270-based transactions with CICS Web Support
- Further Information and Summary

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Agenda

- **What is CICS Web Support?**
- CICS Web Support architecture
- Enabling CICS Web Support
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- Further Information and Summary

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What is CICS Web Support?

- Set of services that enables direct connection from a Web browser to CICS Transaction Server for VSE/ESA
- Enables access to CICS Application Programs and Transactions
- Formerly known as the CICS Web Interface
- New API's provided for "Web aware" applications
- Delivered in CICS Transaction Server for VSE/ESA V1.1.1

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What is CICS Web Support?

TCP/IP

CICS TS for VSE/ESA

CICS Web Support

CICS APPLICATION

VSE/ESA

Intranet, Internet
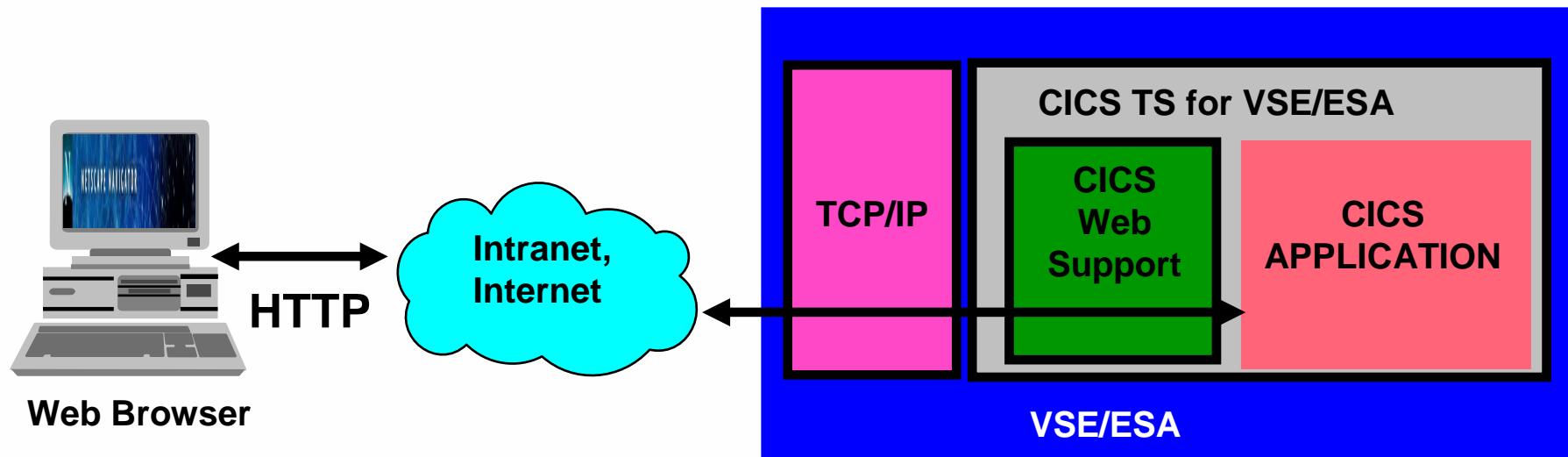
HTTP

Web Browser

- Web browser access to CICS Applications and Transactions
- Direct connection - no intermediate gateways or servers
- Standard HTTP protocol used over TCP/IP
- *Secure Sockets Layer support available with VSE/ESA V2.6*

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Relationship to the CICS Transaction Gateway

Web Server

CICS Transaction Gateway

Web Browser

CICS Transaction Server for VSE/ESA

CICS/VSE V2.3

Java focus

3-Tier Model

CICS Web Support

CICS Transaction Server for VSE/ESA V1.1.1

Web Browser

2-Tier Model

Non-Java

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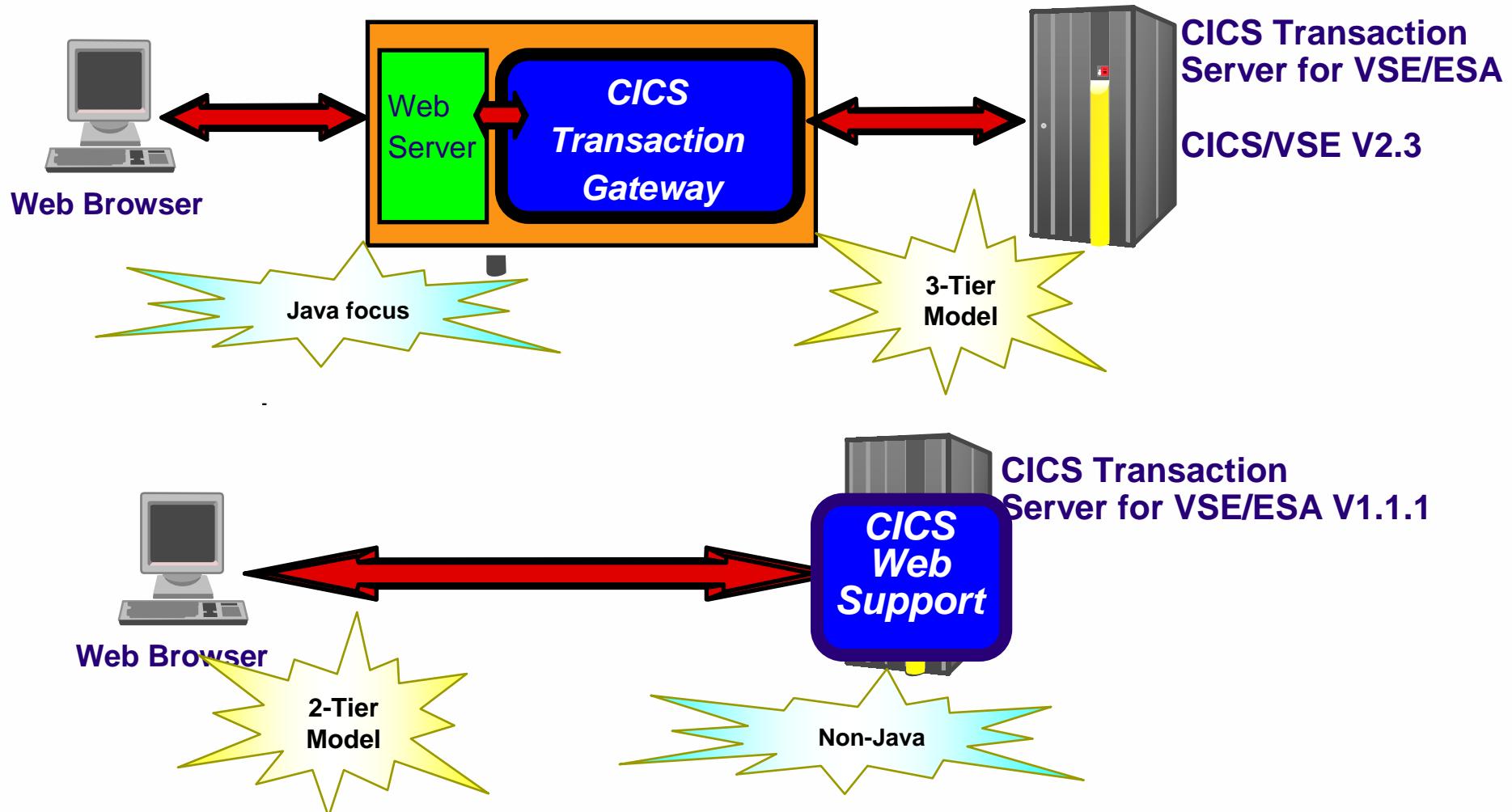
What is CICS Web Support?

■ CICS Application program to be invoked specified in URL

■ Default URL format:

ƒ http://hostid:port/converter/alias/program?optional-token

> **hostid** is the IP address or DNS name of the CICS region
> **port** is the configured listening port number
> **converter** is the name of the program for Decode & Encode processing
> – "CICS" if no converter
> **alias** is the transaction id of the alias transaction
> – "CWBA" is the supplied alias
> **program** is the name of the CICS application program to be invoked
> **optional-token** is optional data to be passed with the request

■ Example URL:

ƒ http://cicstest.ibm.com:1080/cics/cwba/webpgm1

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CICS Web Support Architecture

VSE/ESA

CICS Transaction Server

Request from Web Browser →

TCP/IP for VSE/ESA

→ **Sockets listener task**

→ **Web attach processing**

↔ **DFHCCNV (headers)**

↔ **Analyzer**

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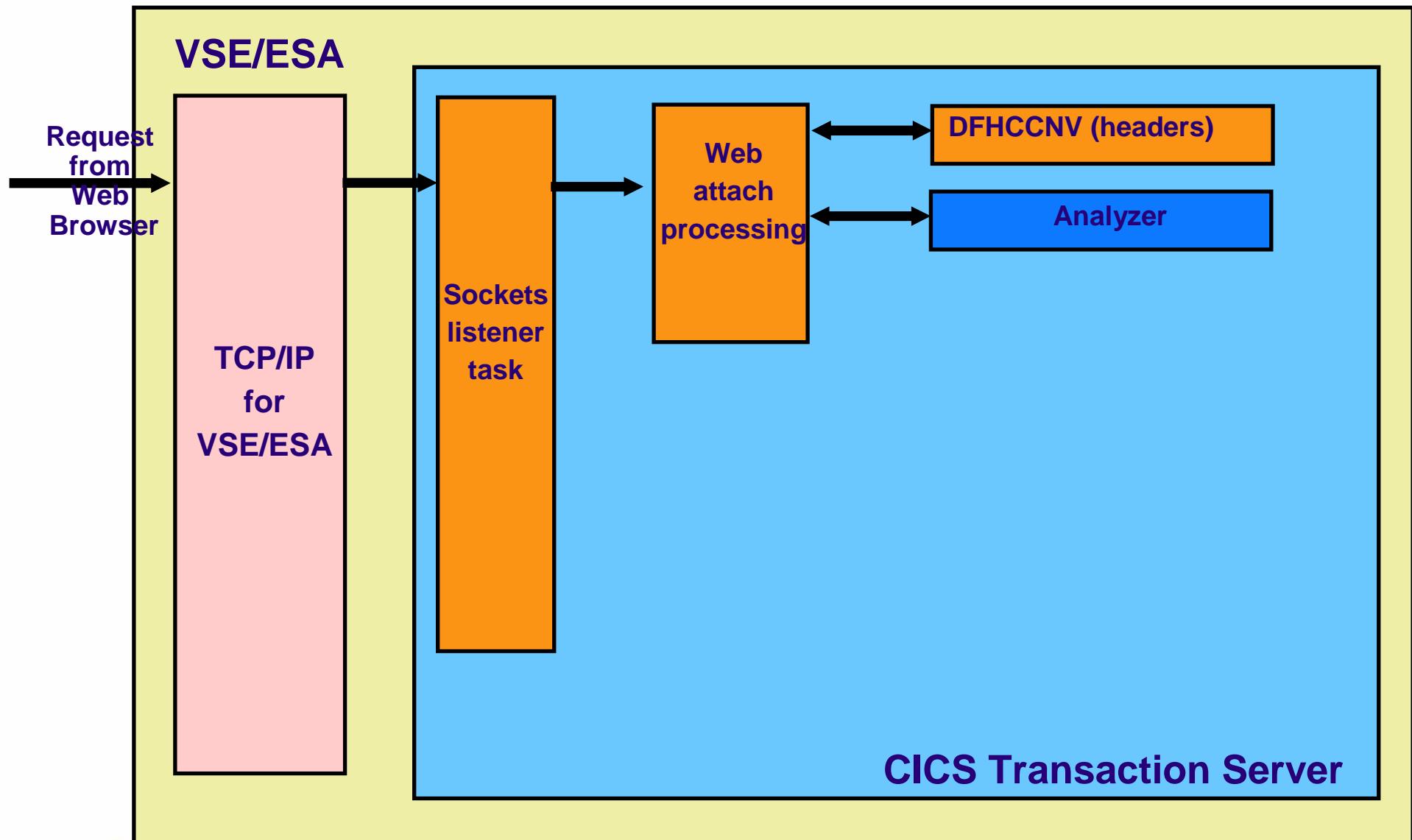
CICS Web Support Architecture

- The **Analyzer**:
  - ƒ Parses the incoming request
  - ƒ Determines resources and context for Alias transaction
  - ƒ Specifies codepage conversion for body of http request
 - ƒ User Replaceable Module
- The supplied default Analyzer:
  - ƒ Provides ISO-8859-01 codepage conversation
  - ƒ Supports the default CWS URL format
    - http://hostid:port/converter/alias/program?optional-token
- The supplied Analyzer programs:
  - ƒ DFHWBADX -----------> Assembler
  - ƒ DFHWBAHX -----------> C
  - ƒ DFHWBALX -----------> PL/I
  - ƒ DFHWBAOX -----------> COBOL

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CICS Web Support Architecture

VSE/ESA

Request from Web Browser →

TCP/IP for VSE/ESA

Sockets listener task

Web attach processing

Alias

DFHCCNV (headers)

Analyzer

DFHCCNV (user data)

Converter (Decode)

CICS Transaction Server

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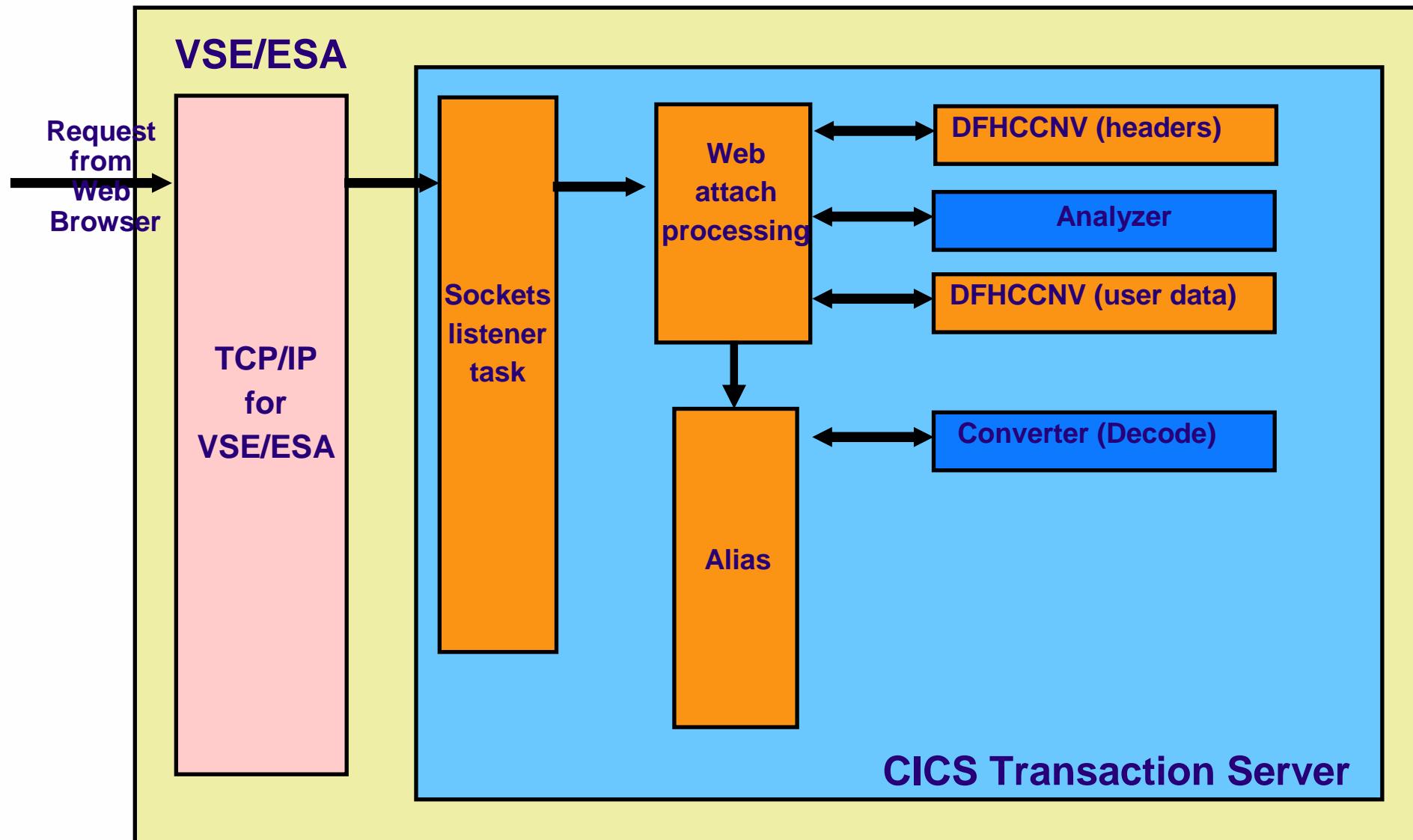
CICS Web Support Architecture

- The **Converter**
  - ƒ Provides **Decode** and **Encode** functions
- **Decode** invoked *before* request passed to CICS application
 - ƒ Maps inbound HTTP request to application COMMAREA
- **Encode** invoked *after* CICS application has processed request
  - ƒ Maps application COMMAREA to outbound HTTP response
- Converter is optional

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CICS Web Support Architecture

VSE/ESA

Request from Web Browser →

TCP/IP for VSE/ESA

Sockets listener task

Web attach processing

Alias

Sockets domain

DFHCCNV (headers)

Analyzer

DFHCCNV (user data)

Converter (Decode)

CICS Application

Converter (Encode)

DFHCCNV

CICS Transaction Server

Reply to Web Browser ←

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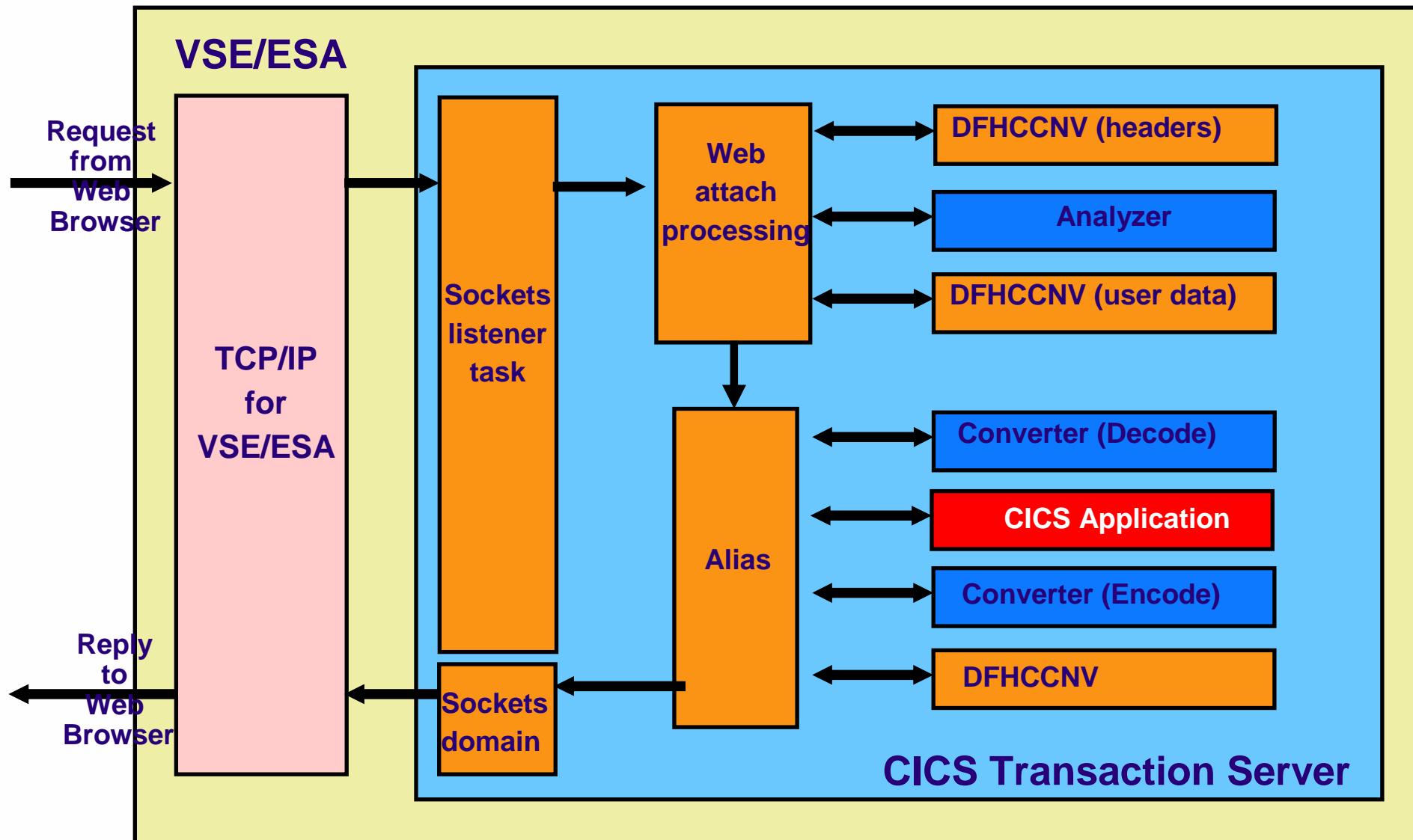
CICS Web Support Architecture

Accessing existing COMMAREA based applications

- Converter used to shield applications from HTTP and HTML
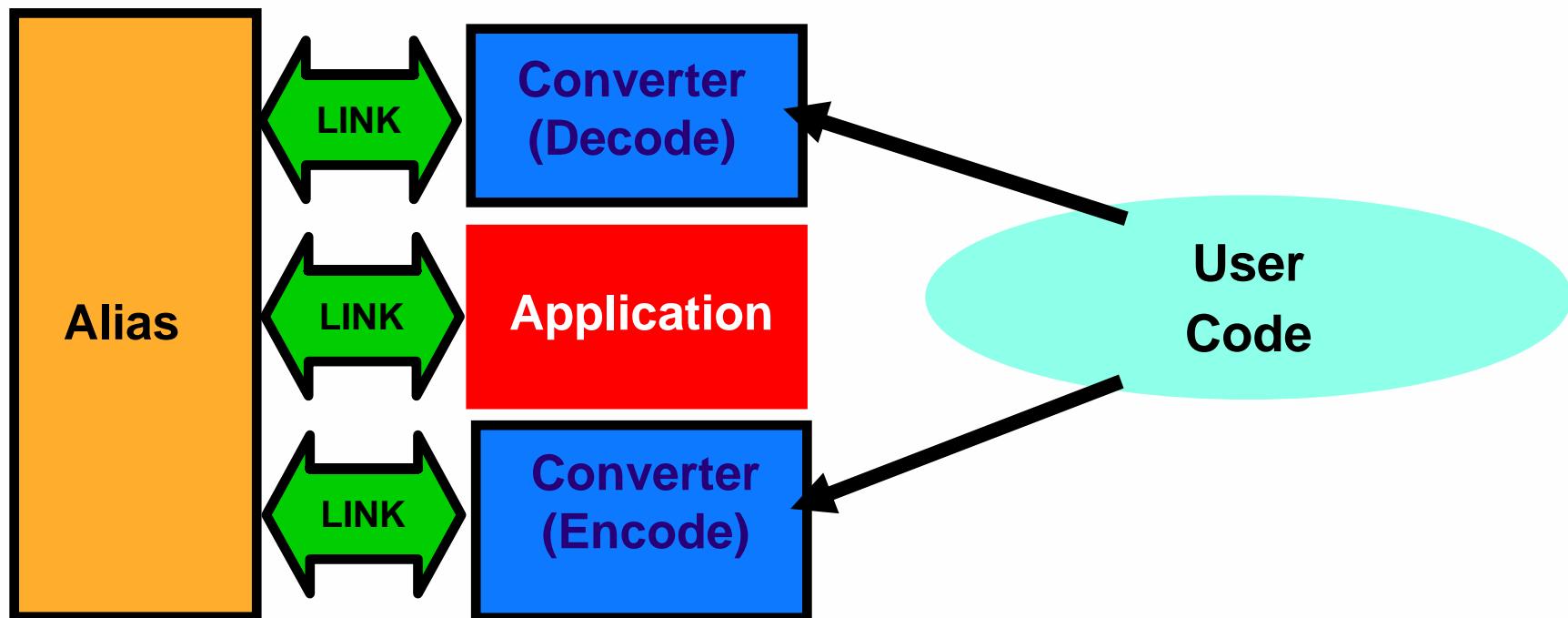
CICS Web Support Architecture

Accessing new CICS "Web aware" Applications

■The picture becomes simpler using the new API's....

Alias ⟷ **LINK** ⟷ **Web aware Application**
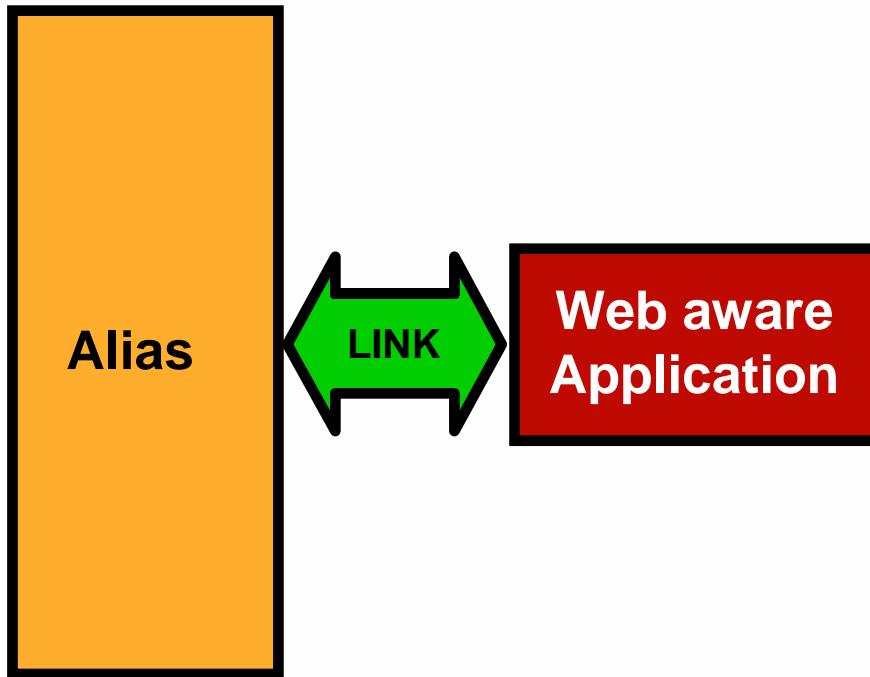
■NB: "Web aware" applications need to understand HTTP

CICS Web Support Architecture

Accessing 3270-based transactions

- Uses the 3270 Bridge support
- Some limitations
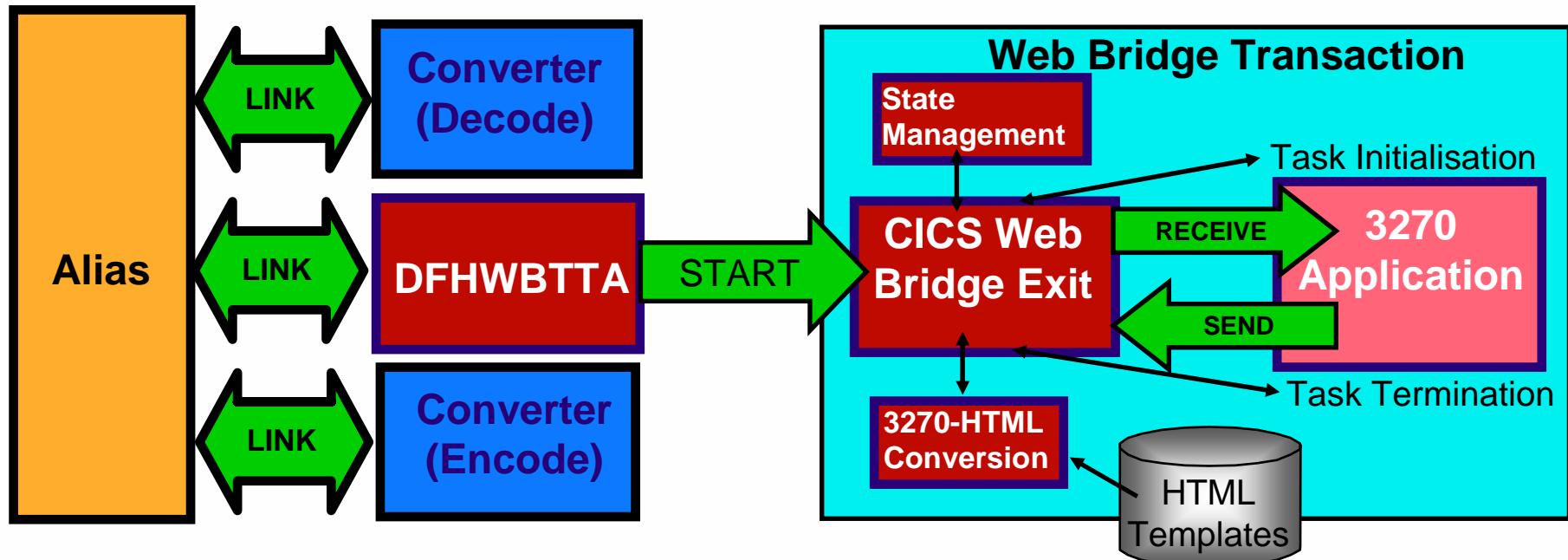
Example URL > http://cics1.ibm.com:1080/cics/cwba/dfhwbtta/ceci

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DFHSIT requirements

- Specify that TCP/IP services are required
  - ƒ TCPIP=YES
- Specify Web 3270 bridge parameters
  - ƒ WEBDELAY=(n,m)
    - *–n = time transaction remains in terminal wait before being terminated*
    - *–m = time during which state data is kept for a transaction*
- Increase EDSA storage
  - ƒ by at least 2M for TCPIP services
  - ƒ 1M per active Web connection
- Additional SIT parameters if using SSL
  - ƒ ENCRYPTION=WEAK|NORMAL|STRONG
  - ƒ KEYFILE=*name*
  - ƒ SSLDELAY= *number*

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Resource Definitions

- Define at least one TCPIPSERVICE
  - ƒ Specifies IP address, port number, name of the analyzer
  - ƒ Also specifies level of SSL support and SSL certificate
  - ƒ Sample specified in DFH$SOT
- Install supplied RDO group DFHWEB
  - ƒ Contains definitions for CWS transactions and programs
- Define any required DOCTEMPLATEs
  - ƒ Required if using new DOCUMENT API

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Other Requirements

■ Define a conversion table using DFHCNV macros

ƒ For HTTP conversion between ASCII and EBCDIC

ƒ Example DFHCNV table:

```
DFHCNV TYPE=INITIAL
*
DFHCNV  TYPE=ENTRY,RTYPE=PC,RNAME=DFHWBHH,USREXIT=NO,
        SRVERCP=037,CLINTCP=8859-1
DFHCNV TYPE=SELECT
DFHCNV TYPE=FIELD,OFFSET=0,DATATYP=CHARACTER,DATALEN=32767,
        LAST=YES
*
DFHCNV TYPE=ENTRY,RTYPE=PC,RNAME=DFHWBUD,USREXIT=NO,
        SRVERCP=037,CLINTCP=8859-1
DFHCNV TYPE=SELECT
DFHCNV TYPE=FIELD,OFFSET=0,DATATYP=CHARACTER,DATALEN=32767,
        LAST=YES
*
DFHCNV TYPE=FINAL
END
```

■ Configure TCP/IP for VSE/ESA

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Other Considerations

- Security
  - ƒ Transactions that compose CICS Web Support
  - ƒ Running Web transactions with end-user specified Userid
  - ƒ Use of Secure Sockets Layer (SSL)
  - ƒ TCP/IP VSE/ESA security facilities
- Operational Support
  - ƒ DFHWBEP - Web Error Program
  - ƒ SPI and CEMT commands

COMMAND	SPI	CEMT
CREATE DOCTEMPLATE		
CREATE TCPIPSERVICE		
DISCARD DOCTEMPLATE		
DISCARD TCPIPSERVICE		
INQUIRE DOCTEMPLATE		
INQUIRE TCPIP		
INQUIRE TCPIPSERVICE		
INQUIRE WEB		
SET TCPIP		
SET TCPIPSERVICE		
SET WEB		

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The new Web API's

■ WEB API
ƒ HTTP protocol

EXEC CICS WEB EXTRACT

EXEC CICS WEB STARTBROWSE
EXEC CICS WEB READNEXT
EXEC CICS WEB ENDBROWSE

EXEC CICS WEB READ
EXEC CICS WEB RECEIVE
EXEC CICS WEB WRITE
EXEC CICS WEB SEND
EXEC CICS WEB RETRIEVE

■ TCP/IP API
ƒ Sockets protocol

EXEC CICS EXTRACT TCPIP
EXEC CICS EXTRACT CERTIFICATE

■ DOCUMENT API
ƒ HTML,XML, etc

EXEC CICS DOCUMENT CREATE
EXEC CICS DOCUMENT INSERT
EXEC CICS DOCUMENT SET
EXEC CICS DOCUMENT RETRIEVE

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The new Web API's....

- **EXEC CICS WEB**
  - ƒ Retrieve components of the inbound HTTP request
  - ƒ Construct HTTP headers to be returned in HTTP response
  - ƒ Select a document for delivery as the body of the response
- **EXEC CICS EXTRACT TCPIP**
  - ƒ Retrieve TCP/IP information
- **EXEC CICS EXTRACT CERTIFICATE**
  - ƒ Retrieve information from the client certificate
- **EXEC CICS DOCUMENT**
  - ƒ Create and manipulate "Documents"
    - –Can be made up of both text and binary elements
    - –Can contain templates, symbols and bookmarks
    - –Bookmarks can be used to insert data at specifics points
    - –Documents can be imbedded
    - –Codepage information stored with document

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New WEB API's....Processing HTTP Requests

Request Line	Headers	Body

WEB EXTRACT

WEB READ HTTPHEADER

WEB RECEIVE
WEB READ FORMFIELD

Headers	Body

WEB STARTBROWSE HTTPHEADER
WEB READNEXT HTTPHEADER
WEB ENDBROWSE HTTPHEADER

WEB STARTBROWSE FORMFIELD
WEB READNEXT FORMFIELD
WEB ENDBROWSE FORMFIELD
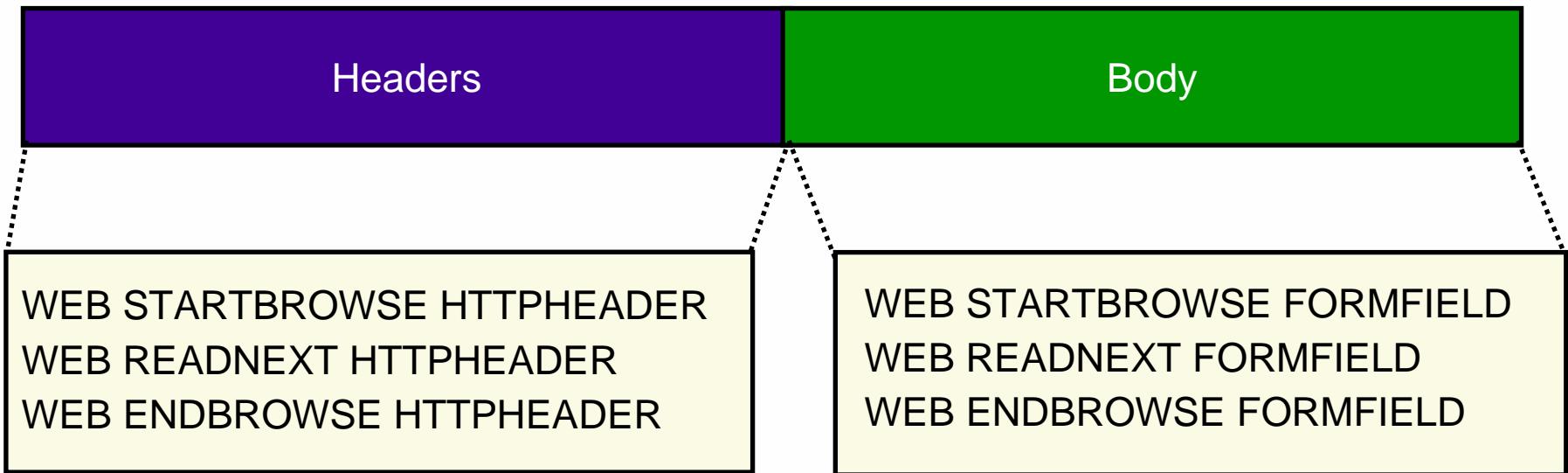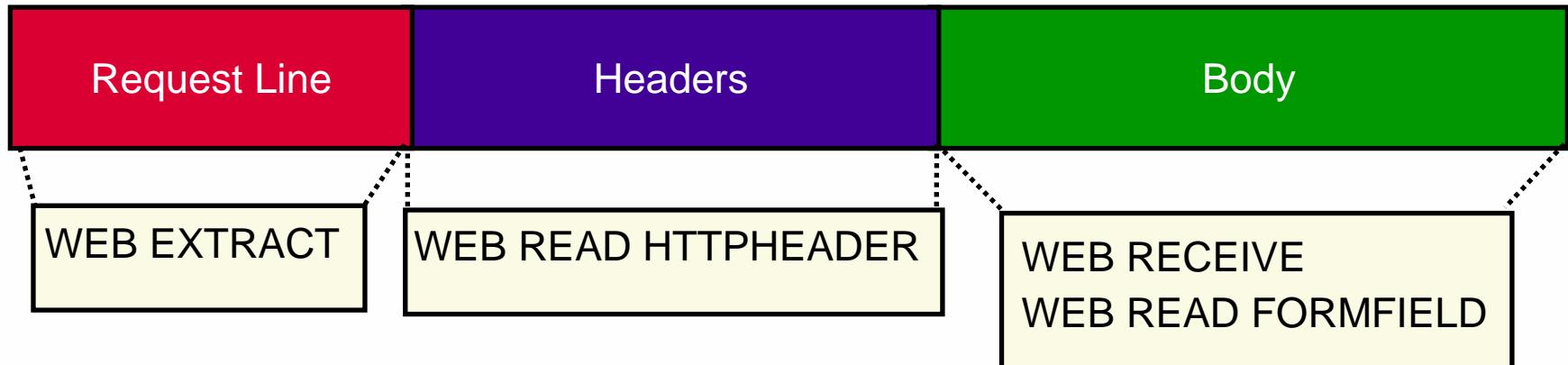
New WEB API's....Processing HTTP Responses

Response Line	Headers	Body

WEB WRITE

DOCUMENT CREATE
DOCUMENT INSERT
DOCUMENT SET
DOCUMENT RETRIEVE

WEB SEND
WEB RETRIEVE

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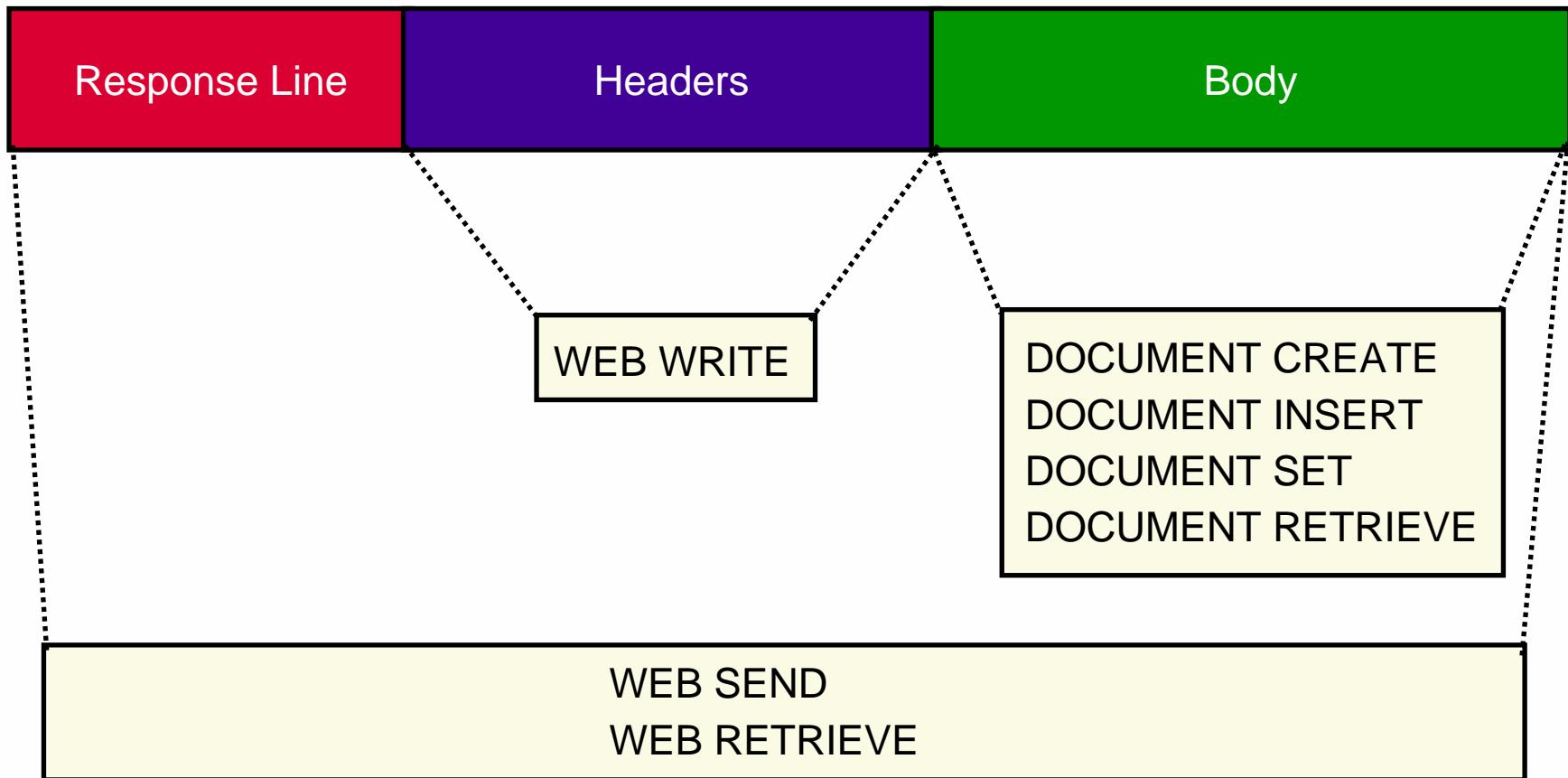
Document Templates

- Templates specified by DOCTEMPLATE resource, can be...
    - ƒ VSE sub-library member, CICS file, TS queue, TD queue
    - ƒ Load module, Exit program
- HTML example:

```
<html>
<head>
<title>Address Book</title>
</head>
<body>
<center>
<h1>&person;</h1><br>
&house_number; &street;<br>
&town;<br>
&zip;<br>
&person; can be reached on &home_number; at home or &work_number; during office hours <br>
</center>
</body>
</html>
```

- Example symbol list for the above would be a single string:

```
"person=Barney Rubble&house_number=2&street=Stoney
Lane&town=Bedrock&zip=&home_number=911&work_number=123-456 "
```

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Document Templates...after substitution

Web API's - code example

```
* Create document from existing HTML template
            EXEC CICS DOCUMENT CREATE DOCTOKEN(DOCTKN)
                TEMPLATE('TEMPL1')
* Get Server TCP/IP address
            EXEC CICS EXTRACT TCPIP
                SERVERADDR(SRVRADDR)  SADDRLENGTH(ADDRL)
* Get Client TCP/IP address
            EXEC CICS EXTRACT TCPIP
                CLIENTADDR(CLNTADDR)  CADDRLENGTH(ADDRL)
* Insert both addresses into document
            EXEC CICS DOCUMENT INSERT DOCTOKEN(DOCTKN)
                TEXT(DOCTXT)  LENGTH(DOCTXTL)
* Add footer to document from existing HTML template
            EXEC CICS DOCUMENT INSERT DOCTOKEN(DOCTKN)
                TEMPLATE('TEMPL2')
* Send completed document
            EXEC CICS WEB SEND DOCTOKEN(DOCTKN)  CLNTCODEPAGE('iso-8859-1')
* Terminate program
            EXEC CICS RETURN


ADDRL         DC  F'15'
DOCTXTL       DC  F'70'
DOCTKN        DC  CL16
DOCTXT        DS  0CL
SRVRTXT       DC   C'<p> Server Address: '
SRVRADDR    DS  CL15
SRVRTXT       DC   C'<p> Client  Address: '
CLNTADDR    DS  CL15
```

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Web API's – Templates example

Document Template - TEMPL1

```
<html>
<head>
<title>Simple CWS Demo</title>
</head>
<body>
<h1>Following info produced via the EXEC CICS EXTRACT, DOCUMENT and WEB API's</h1>
```

Web API's - code example

```
* Create document from existing HTML template
            EXEC CICS DOCUMENT CREATE DOCTOKEN(DOCTKN)
                TEMPLATE('TEMPL1')
* Get Server TCP/IP address
            EXEC CICS EXTRACT TCPIP
                SERVERADDR(SRVRADDR)  SADDRLENGTH(ADDRL)
* Get Client TCP/IP address
            EXEC CICS EXTRACT TCPIP
                CLIENTADDR(CLNTADDR)  CADDRLENGTH(ADDRL)
* Insert both addresses into document
            EXEC CICS DOCUMENT INSERT DOCTOKEN(DOCTKN)
                TEXT(DOCTXT)  LENGTH(DOCTXTL)
* Add footer to document from existing HTML template
            EXEC CICS DOCUMENT INSERT DOCTOKEN(DOCTKN)
                TEMPLATE('TEMPL2')
* Send completed document
            EXEC CICS WEB SEND DOCTOKEN(DOCTKN)  CLNTCODEPAGE('iso-8859-1')
* Terminate program
            EXEC CICS RETURN


ADDRL       DC  F'15'
DOCTXTL     DC  F'70'
DOCTKN       DC  CL16
DOCTXT      DS  0CL
SRVRTXT     DC  C'<p> Server Address: '
SRVRADDR    DS  CL15
SRVRTXT     DC  C'<p> Client  Address: '
CLNTADDR    DS  CL15
```

Web API's - code example

```
* Create document from existing HTML template
          EXEC CICS DOCUMENT CREATE DOCTOKEN(DOCTKN)
              TEMPLATE('TEMPL1')
* Get Server TCP/IP address
          EXEC CICS EXTRACT TCPIP
              SERVERADDR(SRVRADDR)  SADDRLENGTH(ADDRL)
* Get Client TCP/IP address
          EXEC CICS EXTRACT TCPIP
              CLIENTADDR(CLNTADDR)  CADDRLENGTH(ADDRL)
* Insert both addresses into document
          EXEC CICS DOCUMENT INSERT DOCTOKEN(DOCTKN)
              TEXT(DOCTXT)  LENGTH(DOCTXTL)
* Add footer to document from existing HTML template
          EXEC CICS DOCUMENT INSERT DOCTOKEN(DOCTKN)
              TEMPLATE('TEMPL2')
* Send completed document
          EXEC CICS WEB SEND DOCTOKEN(DOCTKN)  CLNTCODEPAGE('iso-8859-1')
* Terminate program
          EXEC CICS RETURN


ADDRL          DC  F'15'
DOCTXTL        DC  F'70'
DOCTKN         DC  CL16
DOCTXT         DS  0CL
SRVRTXT        DC  C'<p> Server Address: '
SRVRADDR       DS  CL15
SRVRTXT        DC  C'<p> Client  Address: '
CLNTADDR       DS  CL15
```

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Web API's - Templates example

Document Template - TEMPL2

```
<p><hr>
<p>Foot of simple CICS Web Support API demo page
</body>
</html>
```

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Web API's – code example

```
* Create document from existing HTML template
          EXEC CICS DOCUMENT CREATE DOCTOKEN(DOCTKN)
              TEMPLATE('TEMPL1')
* Get Server TCP/IP address
          EXEC CICS EXTRACT TCPIP
              SERVERADDR(SRVRADDR)  SADDRLENGTH(ADDRL)
* Get Client TCP/IP address
          EXEC CICS EXTRACT TCPIP
              CLIENTADDR(CLNTADDR)  CADDRLENGTH(ADDRL)
* Insert both addresses into document
          EXEC CICS DOCUMENT INSERT DOCTOKEN(DOCTKN)
              TEXT(DOCTXT)  LENGTH(DOCTXTL)
* Add footer to document from existing HTML template
          EXEC CICS DOCUMENT INSERT DOCTOKEN(DOCTKN)
              TEMPLATE('TEMPL2')
* Send completed document
          EXEC CICS WEB SEND DOCTOKEN(DOCTKN)  CLNTCODEPAGE('iso-8859-1')
* Terminate program
          EXEC CICS RETURN


ADDRL        DC  F'15'
DOCTXTL      DC  F'70'
DOCTKN       DC  CL16
DOCTXT       DS  0CL
SRVRTXT      DC  C'<p> Server Address: '
SRVRADDR     DS  CL15
SRVRTXT      DC  C'<p> Client  Address: '
CLNTADDR     DS  CL15
```

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Web API's – Example output

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Running 3270 based transactions - Architecture

Alias

LINK → **Converter (Decode)**

LINK → **DFHWBTTA** → START →

LINK → **Converter (Encode)**

Web Bridge Transaction

State Management

CICS Web Bridge Exit

RECEIVE → **3270 Application**

SEND

Task Initialisation

Task Termination

3270-HTML Conversion

HTML Templates

Example URL > http://cics1.ibm.com:1080/cics/cwba/dfhwbtta/ceci

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Creating HTML for BMS applications

Recreate source
if necessary

BMS
Macro
Source

TYPE=MAP

TYPE=DSECT

TYPE=TEMPLATE

Mapset
Load Module

Data Structure
Descriptor

Application
Data Sructure

HTML
Template

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Creating HTML for BMS applications....

A template generated by the standard method contains…

- Constants and input fields from the map
- Buttons to represent:
  - ƒ ENTER key
  - ƒ PA1, PA2, PA3 keys
  - ƒ Program function keys PF1 to PF24
  - ƒ HTML Reset
- Hidden variables
  - ƒ For handling conversations/pseudoconversations
  - ƒ For holding name of map field where cursor is set
- JavaScript
  - ƒ Function to set the cursor position to a specific field
  - ƒ Exception handler for tracking cursor movement

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Customising HTML for BMS applications

■Customise via CICS supplied macros

■Edit the generated HTML

■Run time customisation via use of Converter

ƒ Input (Decode)

  –e.g. change AID, change cursor position

ƒ Output (Encode)

  –e.g. add timestamp

Customising HTML for BMS applications....

Customising via the DFHMDX macro......

- Defines customization macros used for template creation
- Is invoked from DFHMSX
- Can be used to
  - ƒ Suppress HTML Reset
  - ƒ Change or suppress PF keys and associated text
  - ƒ Provide an HTML title or masthead graphic
  - ƒ Change the background
  - ƒ Modify BMS colours
  - ƒ Suppress parts of the BMS map
  - ƒ Add Web browser control functions, e.g. JavaScript

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Customising HTML for BMS applications....

Customising via the DFHWBOUT macro

- Add invocations of DFHWBOUT to BMS source
- Can be used to
  - ƒ Add HTML header information
  - ƒ Add text to HTML page that is not part of BMS map
  - ƒ Add Web browser control functions, e.g. JavaScript

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Examples - DFHMDX & DFHWBOUT

* Set default PF keys for all maps and mapsets

        DFHMSX
        DFHMDX MAPSET=*,MAP=*,
                        PF1='Help',PF3='Exit',PF4='Save',PF9='Messages'

 * Change title and PF4 for all maps in mapset DFHWB0

        DFHMDX MAPSET=DFHWB0,MAP=*,
                        TITLE='CICS Web Support - Demo Application',
                        PF4='Messages'

* Add text that appears only on the HTML page

        DFHWBOUT '<p>This text illustrates the use of the DFHWBOUT macro,'
        DFHWBOUT ' which can be used to output text that only appears'
        DFHWBOUT ' in HTML templates and not in the corresponding BMS map.'

* Add HTML header information to the HTML page

        DFHWBOUT '<meta name="author" content="E Phillips Oppenheim">'
        DFHWBOUT '<meta name="owner" content="epoppenheim@xxx.com">'
        DFHWBOUT '<meta name="review" content="20000314">'

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HTML for non-BMS applications

- Default presentation...

- Page produced in fixed width font

- Supplied Headers and Footers
  - ƒ Mandatory HTML page elements
  - ƒ Input buttons (ENTER, PF Keys, etc)

- Customisation...

- Provide replacement header and footer templates

- Use a converter for customisation at run time
  - ƒ Input (Decode)
    - –e.g. change AID, change cursor position
  - ƒ Output (Encode)
    - –e.g. add timestamp

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3270 based transactions – limitations

■ The CICS Web Bridge supports
  - ƒ Terminal Control -> SEND, CONVERSE, RECEIVE
  - ƒ Mimimum BMS and SEND TEXT
■ The following restrictions have been removed by PTF UQ69745:
  - ƒ No dynamic modification of attribute bytes
  - ƒ Multiple SEND MAPs for one screen not supported
  - ƒ Cannot mix BMS and non-BMS SEND commands
  - ƒ Structured fields not supported
  - ƒ Lightpen emulation not supported
  - ƒ Must use same map on a RECEIVE following a SEND

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Accessing Existing CICS Transactions...non-BMS

```
CICS Web Interface screen emulation - Netscape               _ 🗗 ✕
File  Edit  View  Go  Communicator  Help

 Back   Forward  Reload  Home   Search  Guide   Print  Security  Stop        N

┌─────────────────────────────────────────────────────────────────────┐
│                                                                       │
└─────────────────────────────────────────────────────────────────────┘

  STATUS:    ENTER ONE OF THE FOLLOWING

  ABend          DEQ            INquire        RECeive        STARTBr
  ACquire        DISAble        ISsue          RELease        SUspend
  ADdress        DISCard        Journal        RESEtbr        SYncpoint
  ALlocate       DUmp           LInk           RESYnc         Trace
  ASKtime        ENAble         LOad           RETRieve       Unlock
  ASSign         ENDbr          Monitor        RETUrn         Verify
  BIf            ENQ            PErform        REWrite        WAIT
  BUild          ENTer          POInt          ROute          WAITCics
  CAncel         EXtract        POP            SENd           WRITE
  CHange         FEpi           POSt           SET            WRITEQ
  COLlect        FOrmattime     PURge          SIGNOFf        Xctl
  CONNect        FREE           PUSh           SIGNON
  CONVerse       FREEMain       Query          SPOOLClose
  CReate         GDs            READ           SPOOLOpen
  DELAy          GEtmain        READNext       SPOOLRead
  DELETE         Handle         READPrev       SPOOLWrite
  DELETEQ        IGnore         READQ          START


  PF  1  HELP  2  HEX  3  END  4  EIB  5  VAR  6  USER          9  MSG


  PF1   PF2   PF3   PF4   PF5   PF6   PF7   PF8   PF9   PF10   PF11   PF12
  PF13  PF14  PF15  PF16  PF17  PF18  PF19  PF20  PF21  PF22   PF23   PF24
  PA1   PA2   PA3   Clear   Enter   Pen   Reset

     Document: Done
```

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Accessing Existing CICS Applications...BMS

BMS application - 3270 screen.....

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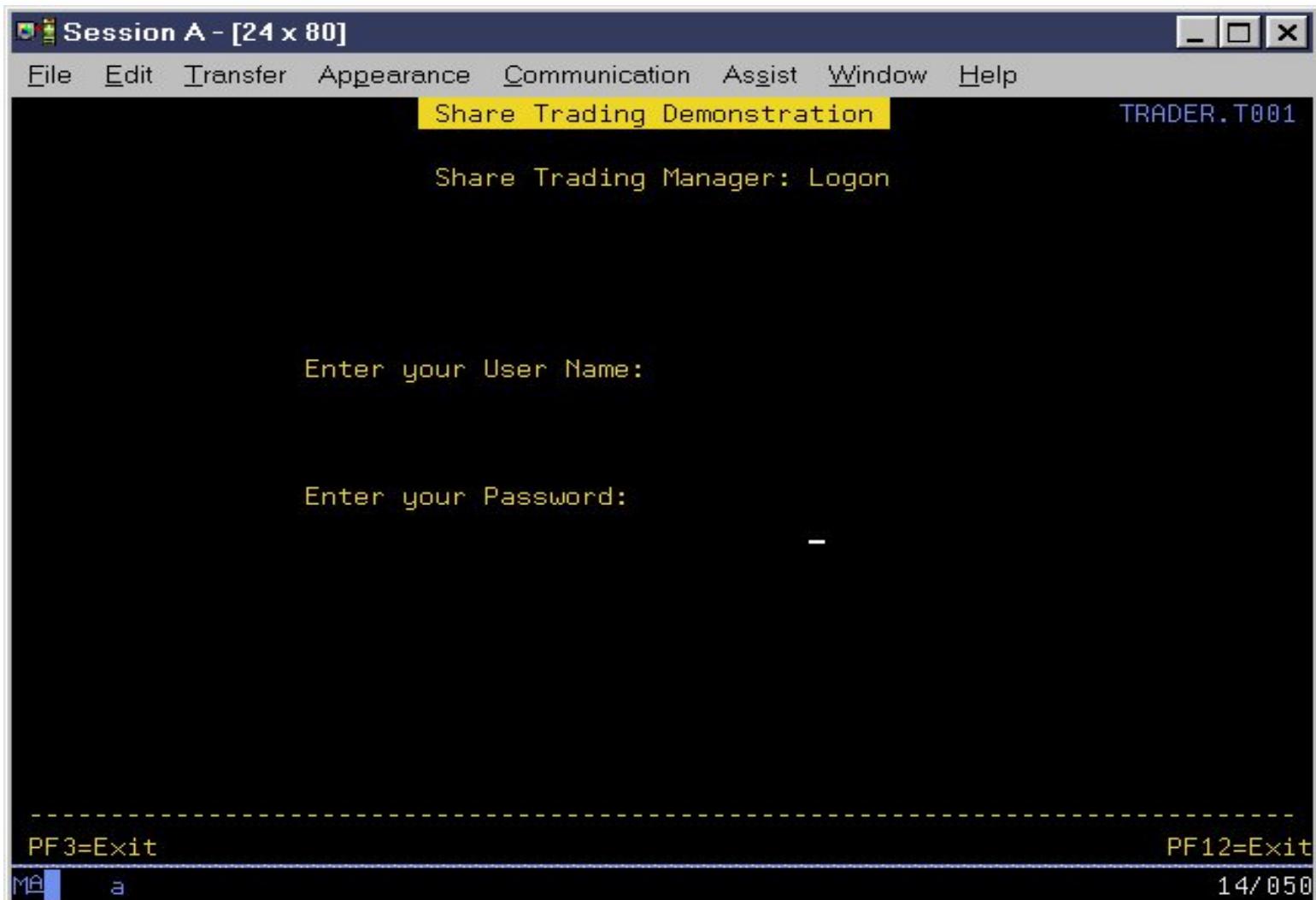
Accessing Existing CICS Applications...BMS

BMS application - default Web browser appearance.....
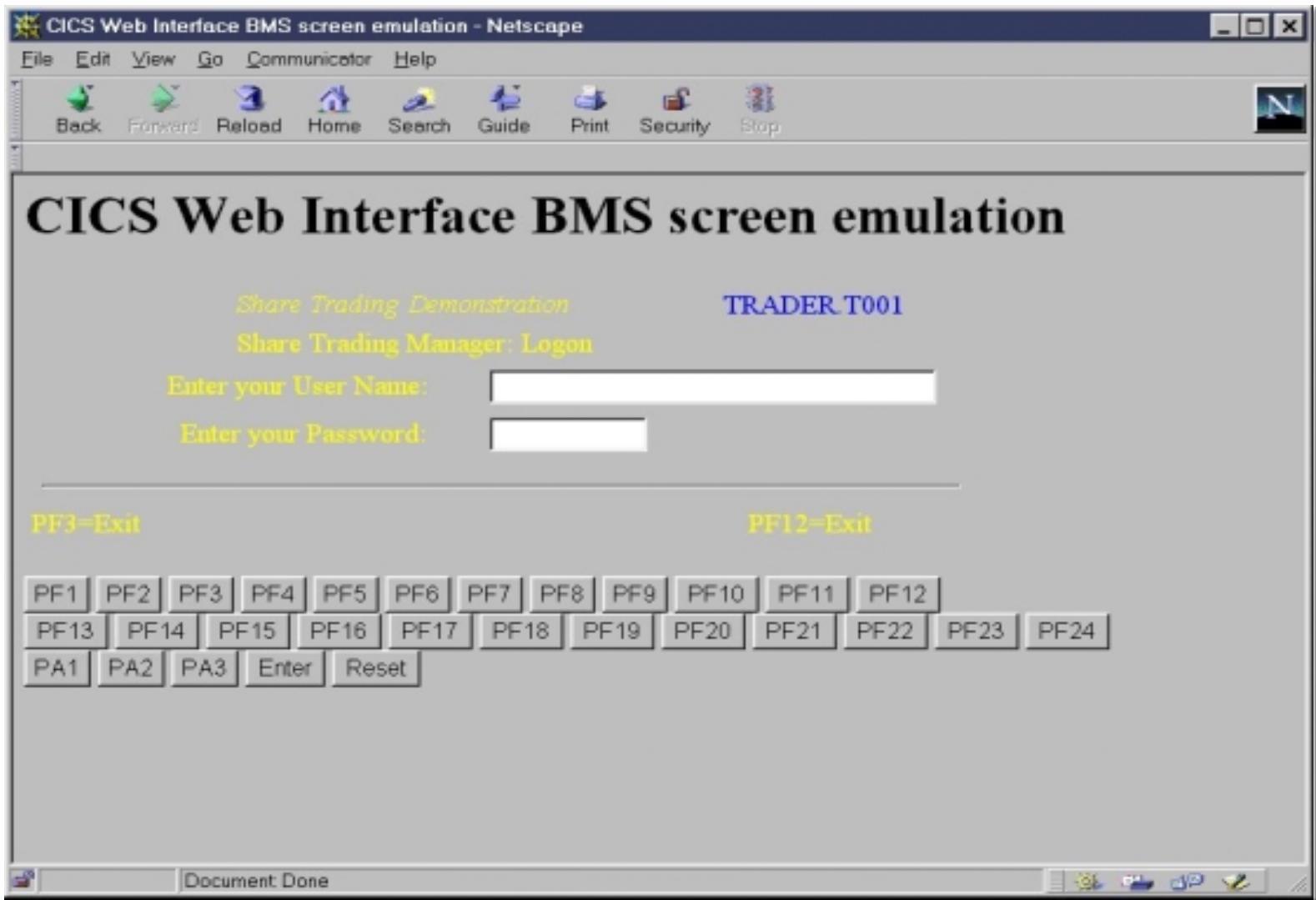
Accessing Existing CICS Applications...BMS

BMS application - customised.....
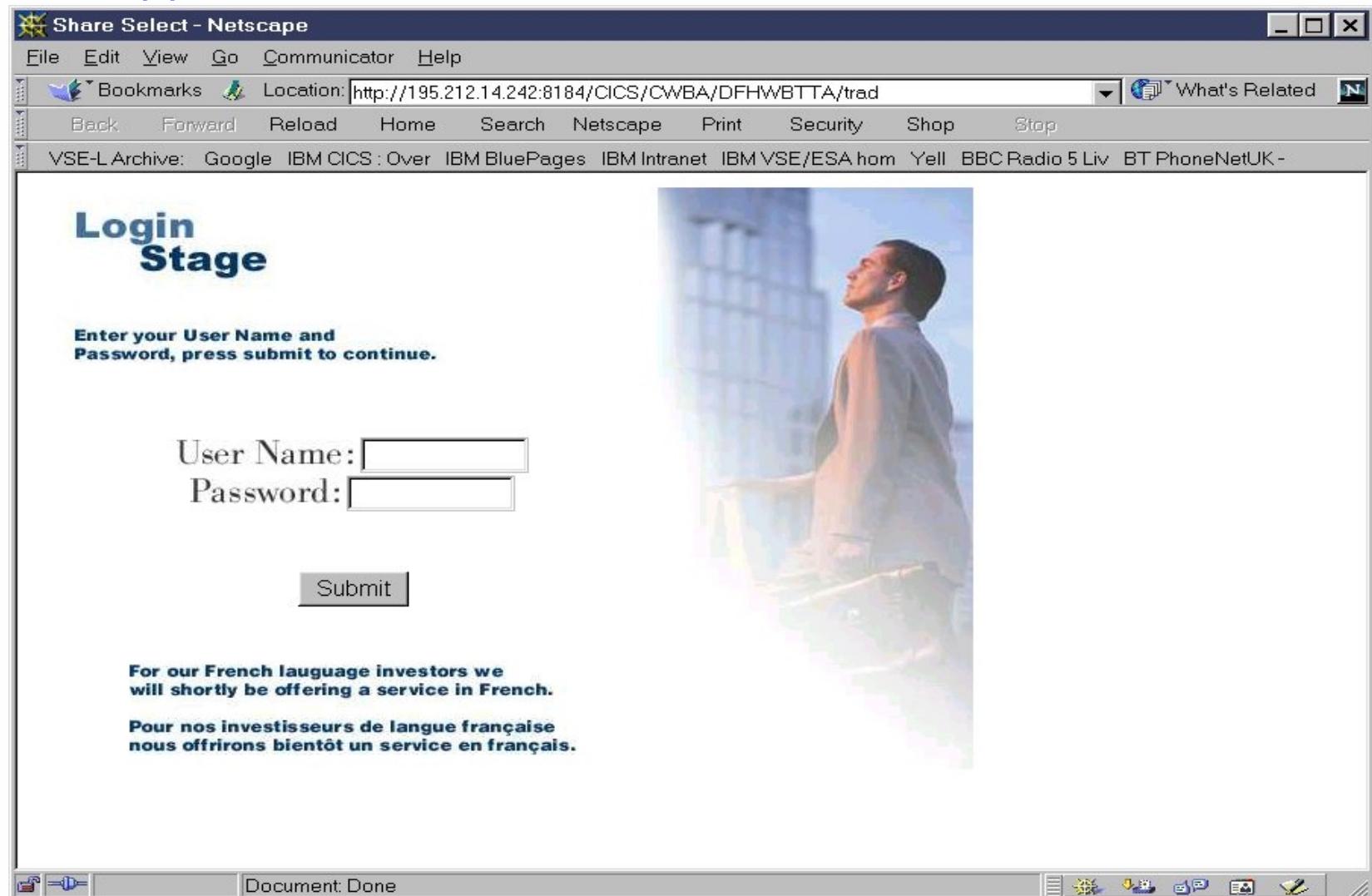
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Agenda

- What is CICS Web Support?
- CICS Web Support architecture
- Enabling CICS Web Support
- Writing CICS Web applications
- Running 3270-based transactions with CICS Web Support
- **Hints & Tips**
- Further Information and Summary

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Hints & Tips

- Apply PQ33097 - Set SOCKETCLOSE parm to '0' instead of 'NO'

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Agenda

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Further Information

∎ Web Sites
 ƒ CICS (main site)
  – http://ibm.com/cics
 ƒ CICS Transaction Server for VSE/ESA
  – http://ibm.com/cics/platforms/cicsvse/
 ƒ CICS (SupportPacs)
  – http://ibm.com/cics/txppacs/
 ƒ VSE/ESA
  – http://www.s390.ibm.com/vse
 ƒ Redbooks
  – http://www.redbooks.ibm.com

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Further Information....

■ Publications

Title	Number
CICS Transaction Server for VSE/ESA V1.1.1 product publications	
Internet Guide	SC34-5765
Enhancements Guide	GC34-5763
External Interfaces Guide	SC33-1669
IBM Redbooks	
CICS Transaction Server for VSE/ESA: CICS Web Support	SG24-5997
Revealed! Architecting Web Access to CICS	SG24-5466
Getting Started with TCP/IP for VSE/ESA V1.4	SG24-5626
e-business Solutions for VSE/ESA	SG24-5662

f Accessible from the CICS and IBM Redbooks Web sites

Further Information....

- Announcement Letters
  - ƒ CICS Transaction Server for VSE/ESA V1.1.1: 200-293
  - ƒ VSE/ESA V2.6: 201-325
  - ƒ VSE/ESA V2.7: 203-043

Summary

CICS Web Support....

- Access to CICS Application programs and transactions from standard Web Browsers
- Direct connection
- Standard HTTP protocol used
- Secure Sockets Layer supported
- New APIs to enable creation of new Web aware applications
- Provided with CICS Transaction Server for VSE/ESA V1.1.1

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CICS Web Support:
Access to CICS Applications from the Web

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Chattanooga, April 30 – May 4 2004

Appendix

APPENDIX

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HTTP Request

| Request Line	Headers	Body

⬤**Request Line : method absolute_path http_version CRLF**
   POST /bin/cgi HTTP/1.0

⬤**Headers: headername: value CRLF**
   Accept: image/jpeg
   Content-length: 44

⬤**Null Line: single CRLF delimits end of headers**

⬤**Body: URL encoded forms data : name=value pairs**
   field1=stringa&field2=stringb&field3=stringc

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HTTP Response

Status Line	Headers	Body

- **Status Line: HTTP_version status_code text CRLF**

  HTTP/1.0 200 Document follows

- **Headers: headername: value CRLF**

  Content-type: text/html

  Content-length: 46

  Last-modified: Wed, 04 Oct 2000 08:45:00 GMT

- **Null Line: single CRLF delimits end of headers**

- **Body: HTML tags and text**

  <html><title>A Sample</title><h1>Sample 1</h1></html>