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TXSeries Application Programming

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TXSeries V7.1 for Multiplatforms
The Next Generation of Distributed CICS
www.ibm.com/CICS

09 Sep 2009

Agenda

Introduction to TXSeries API's

Server: CICS APIs

Sample C application deployment Demo

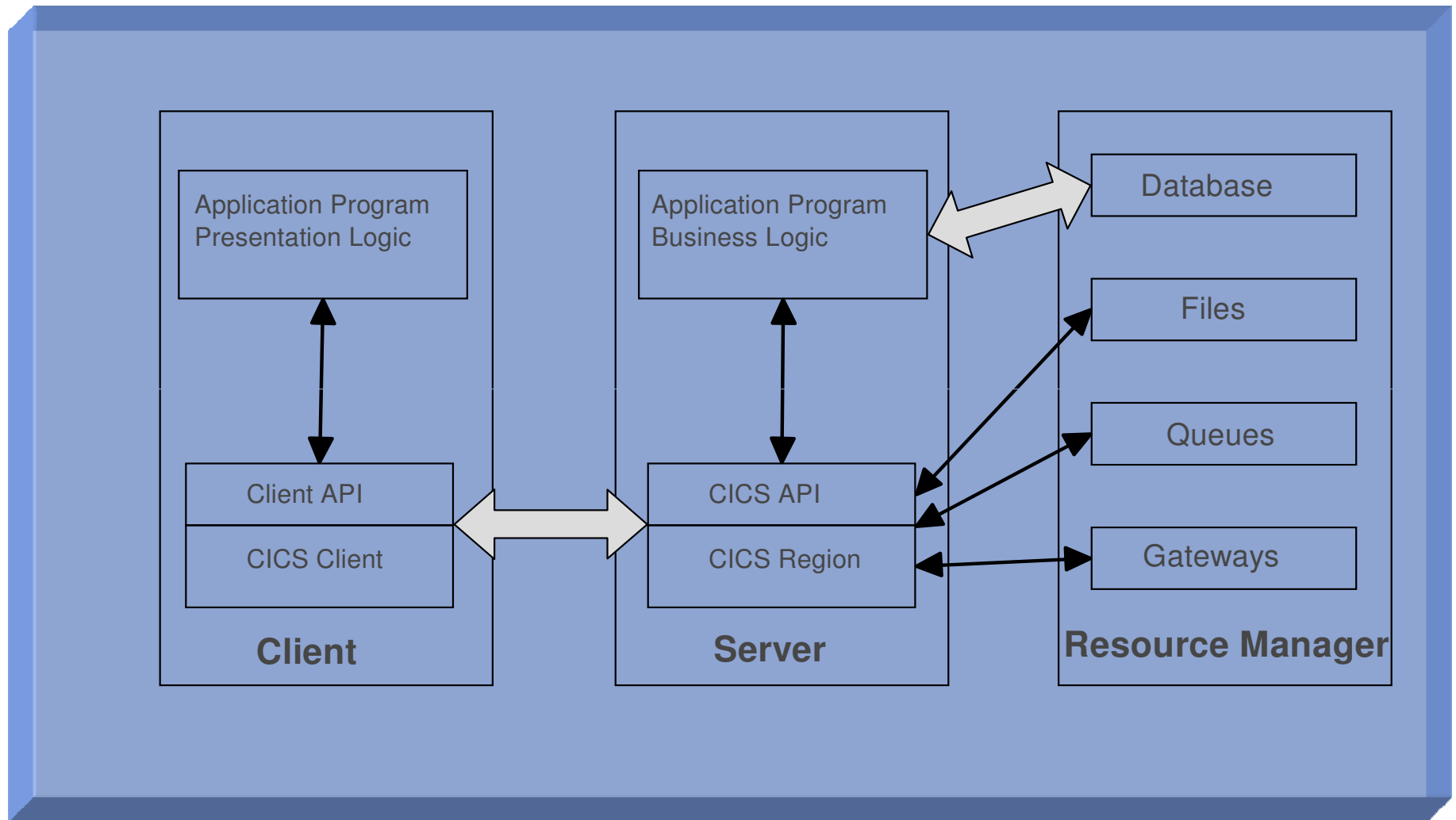
Client: ECI and EPI Programming

CICS Application Development using RDz

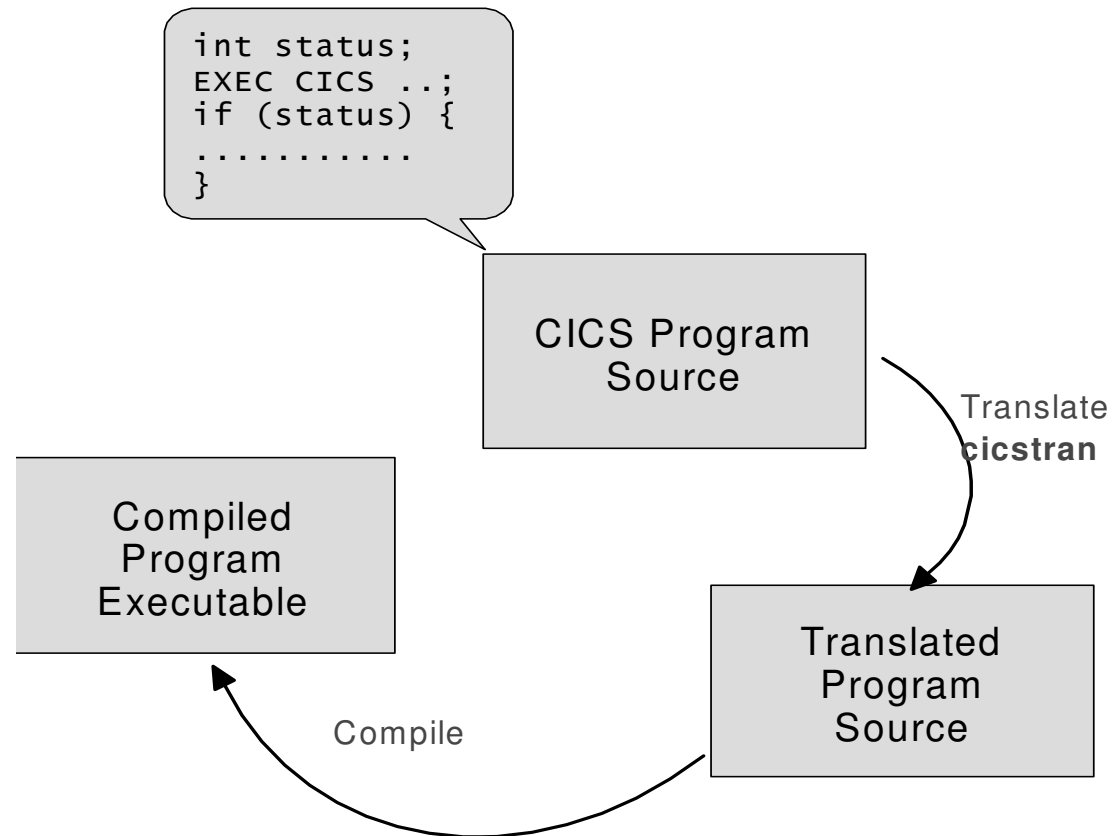
Sample CICS COBOL application syntax check demo

Banking Application Demo

A typical CICS based client/server system



CICS Application Development



CICS Application Programming Interface (API)

Common API for all CICS family members.

The CICS API supported by TXSeries is a subset of the CICSTS API.

Similar to Embedded SQL, Uses Key word EXEC CICS

It provides a whole range of CICS specific facilities but also provides an abstraction for standard programming facilities such as a file system, user I/O (terminals), users (security) and client or distributed region communications

Translated into the appropriate host language program by a pre-compiler.

e.g

```
int status;  
EXEC CICS INQUIRE PROGRAM(program) STATUS(status);  
if (status) {  
.....  
}  
EXEC CICS LINK PROGRAM(program) RESP(resp_code)  
END EXEC  
IF resp_code == .... THEN
```

CICS API Services

Presentation Services

Using BMS

- SEND TEXT
- SEND CONTROL
- SEND MAP
- RECEIVE MAP

Data Services

External resource/RDBMS

Uses SQL in the form of Embedded SQL

File Services

- READ
- WRITE
- BROWSE

Queue Services

- TSQ
- TDQ

Problem Determination Services

Error handling

- ABEND
- HANDLE ABEND
- HANDLE CONDITION
- IGNORE CONDITION

Debugging services

- TRACE
- ENTER
- DUMP

Performance monitoring

- COLLECT STATISTICS
- INQUIRE STATISTICS
- PERFORM STATISTICS RECORD
- SET STATISTICS

Business Logic Services

Program Execution

- LINK
- RETURN
- XCTL

Timer Service

- ASKTIME
- CANCEL
- DELAY
- FORMATTIME
- START

Synchronization Services

- DEQ
- ENQ

Storage services

- ADDRESS
- FREEMAIN
- GETMAIN
- LOAD
- RELEASE
- LUW Services
- RETURN
- SYNCPOINT

"Hello World" – In "C" – Hello.ccs

```
#include <stdio.h>  
#include <string.h>  
  
void main(void)  
{  
    char word[] = "Hello World";  
    EXEC CICS WRITE OPERATOR TEXT(word) TEXTLENGTH(strlen(word));  
    EXEC CICS SEND FROM (word) LENGTH (strlen(word));  
    fprintf(stderr, "%s\n", word);  
    fprintf(stdout, "%s\n", word);  
    EXEC CICS RETURN;  
}
```

Compiling and Running

Use `cicstcl -IC hello.ccs` to translate, compile and link `hello.ccs`

Add Program Definition in the Region

```
cicsadd -c pd -r TESTREG -B HELOPROG PathName=/tmp/TXDemo/hello
```

Add Transaction Definition in the Region

```
cicsadd -c td -r TESTREG -B HELO ProgName=HELOPROG
```

Start `cicslterm`.

Run the transaction HELO.

You should see "Hello World" on your screen, and twice on "`cicstail -r REGNAME`", once for "`WRITE OPERATOR(CSMT.out)`" and second for "`stderr(console.<latest>)`". Stdout sends the message to `console.msg` file.

Sample TXSeries C Application Deployment Demo

Google - Mozilla Firefox: IBM Edition

File Edit View Go Bookmarks Yahoo! Tools Help

http://www.google.co.in/

Web Images Maps News Orkut Groups Gmail more

iGoogle | Search settings | Sign in

Google™

India

Google Search I'm Feeling Lucky

Search: ☒ the web ☐ pages from India

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Done

Debugging CICS Application

Logs & Messages.

- Console

- CSMT

- Symrecs

CEDF Internal Transaction.

CDCN Internal Transaction.

CADB Internal Transaction.

Dumps

Traces

CICS Clients

Mechanism to access CICS systems for “External World!”

CICS Universal Clients

- External Call Interface (ECI)

- External Presentation Interface (EPI)

CICS supplied Clients

- cicslterm - A 3270 - RPC client.

- cicsteld – A telnet 3270 server.

External Call Interface (ECI)

Enables, a non-CICS application running on client, to call a CICS application running on a CICS region.

It provides the facility to pass data to & fro across to a CICS server

Supports COBOL, C, C++ and Java programming languages

Connect to multiple CICS servers simultaneously

Access all CICS resources (like files, queues etc.)

Synchronous or asynchronous call to CICS server programs

```
/* Sample ECI call snippet*/
/*****
/* Ask the Client for a list of servers to connect to */
*****/

rc = CICS_EciListSystems(NULL,&serverCount,servers);
if (rc != ECI_NO_ERROR) {
    Response(rc, NULL, 0);
    if (rc != ECI_ERR_MORE_SYSTEMS) return 1;
}
```

External Presentation Interface (EPI)

The External Presentation Interface (EPI) is a programmable interface that allows a user application to intercept CICS 3270 data streams. This interface is the basis for putting a GUI on already existing CICS green-screen applications.

Gets input from a non-3270 terminal/display and translates as a 3270 data stream for the CICS application

Supports COBOL, C, C++ and Java applications

Essentially a 3270 interpreter. An easy way to wrap legacy CICS applications in to a modern GUI

```
/* EPI CALL SAMPLE Snippet */  
/*****  
/* Initialise the EPI with latest version of the API      */  
/*****  
  
rc = CICS_EpiInitialize(CICS_EPI_VERSION_200);  
if (rc != CICS_EPI_NORMAL)  
{  
    Response(rc);  
    return 1;  
}  
  
rc = CICS_EpiListSystems(NULL, &serverCount, servers);  
if (rc == CICS_EPI_NORMAL)  
{
```

ECI vs EPI

Ease of use or programming

The ECI API is the most common for newer applications because the CICS transactions are written to pass data areas (commarea / containers) back and forth rather than depend on terminal I/O

This removes the 'communications logic' from the user written code and concentrates on the data and the problem to be solved

EPI requires the interpretation of 3270 data streams which is much complicated

Conversing with the server

ECI passes program data in a data area

EPI passes program data in terminal fields

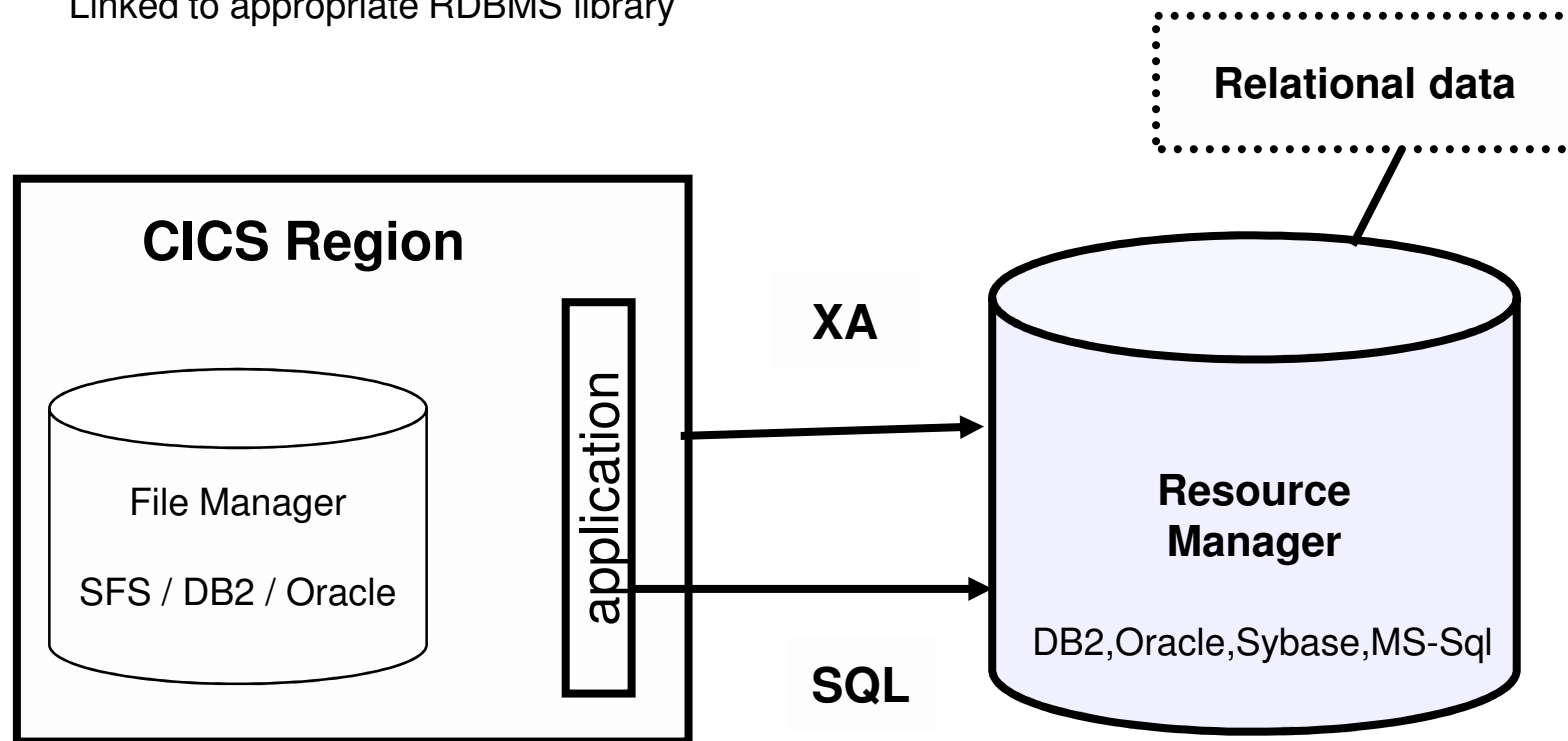
CICS Application Programming for External Resource

CICS communicates with the External resource through a open standard protocol.
External Resource being an RDBMS

CICS Application Programs use SQL to communicate to RDBMS

Should be pre-compiled with RDBMS pre-compiler

Linked to appropriate RDBMS library





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Developing CICS Applications using RDz

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Introduction

Rational Developer for System z (RDz) offers IDEs with features and easy-to-use tools to help WebSphere, CICS, and IMS developers rapidly design, code, and deploy complex applications.

RDZ uses TXSeries as the under lying engine to support:

- Developing CICS applications in IBM PL/I and COBOL for Windows

- Checking the syntax of multiple versions of COBOL CICS applications, CICS-TS and TXSeries.

- Translating, compiling and testing TXSeries COBOL CICS applications.

CICS Application Syntax Check using RDZ: Demo





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Online Banking Demo Using TXSeries

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Introduction

Banking application simulates a typical banking environment.

It demonstrates TXSeries as a Online Transaction Processor in Banking Environment.

Functionality

Admin Users (Login using 3270 Terminals)

Creates accounts

Account Operations(Deposit, Withdraw)

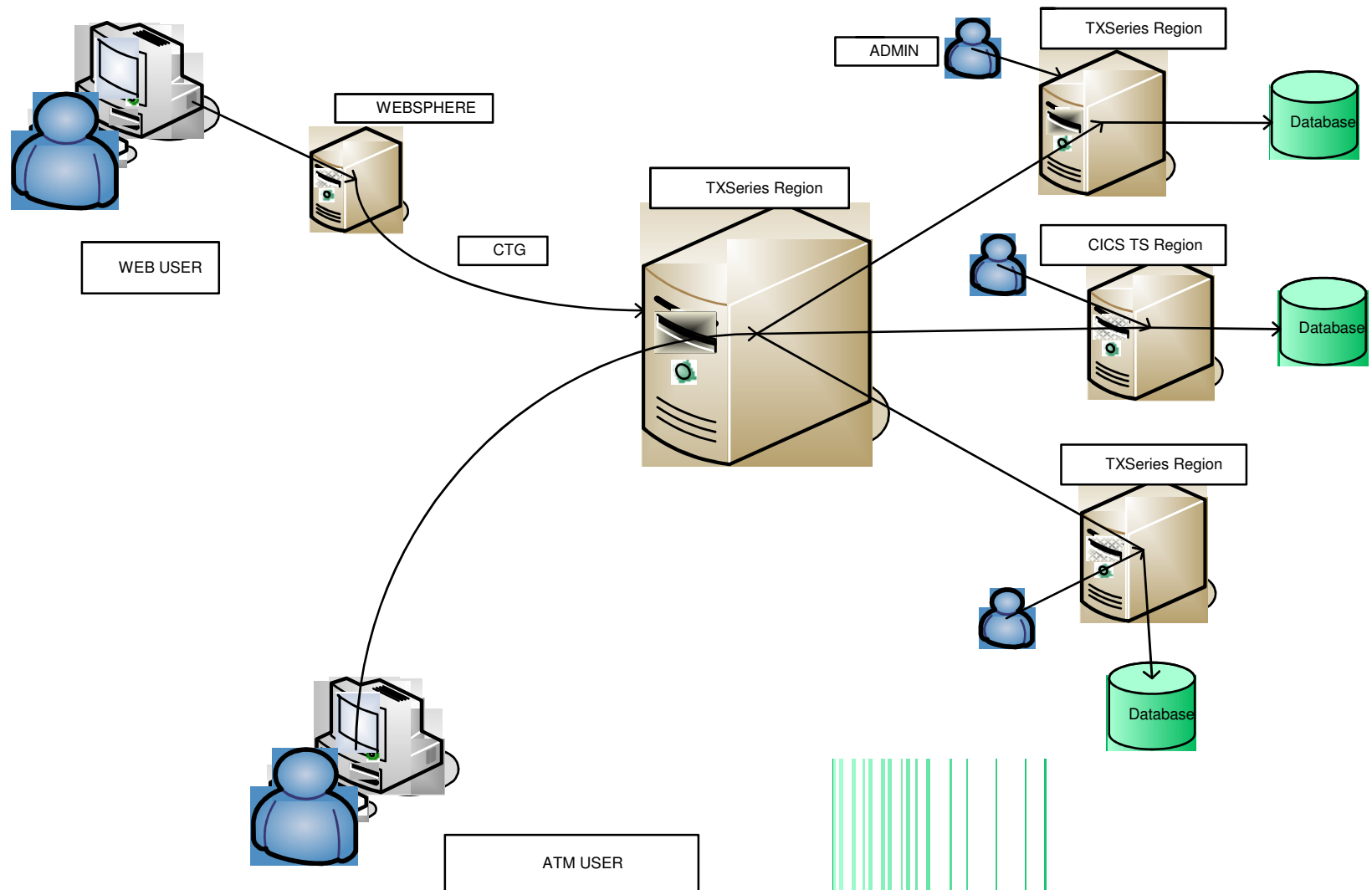
Users (Login through web/ATM)

Reads balance

Deposits, Withdraws, Transfer money

Change password, View transaction details

Architecture





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Banking Demo

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Admin user login's to his Account 😊

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ADMIN LOGIN

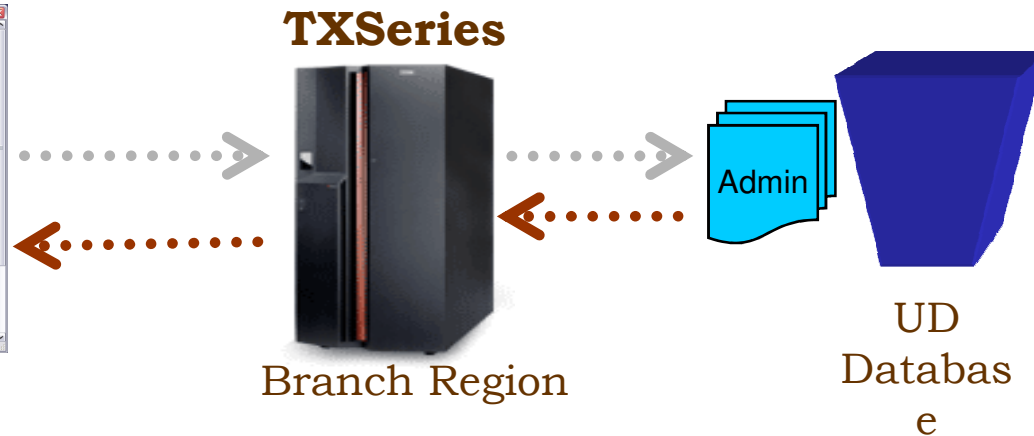
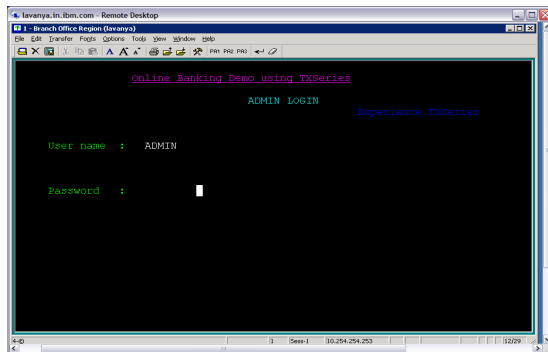
Experience TXSeries

User name : ADMIN

Password :

█

Behind the scenes...



CICS authenticates the user based on the user information stored in UD database and sends the Menu screen to the user

Admin chooses to create a new account
from the menu

Online Banking Demo using TXSeries

ADMIN MENU

Experience TXSeries

- 1 - Create a New Account
- 2 - Account Operations
- 3 - Logoff

Enter your Choice: 1

Admin gives the customer name
and address

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ACCOUNT CREATION

Experience TXSeries

ENTER THE FOLLOWING CUSTOMER DETAILS

NAME : Madhuri

ADDRESS :
IBM, Bangalore

F3 - Back to Menu

4-©

1

Sess-1

10.254.254.253

15/32

Admin provides the new account details to the customer

Online Banking Demo using TXSeries

ACCOUNT CREATION

Experience TXSeries

ENTER THE FOLLOWING CUSTOMER DETAILS

NAME : Madhuri

ADDRESS :
IBM, Bangalore

Account created. Press Ctrl Key

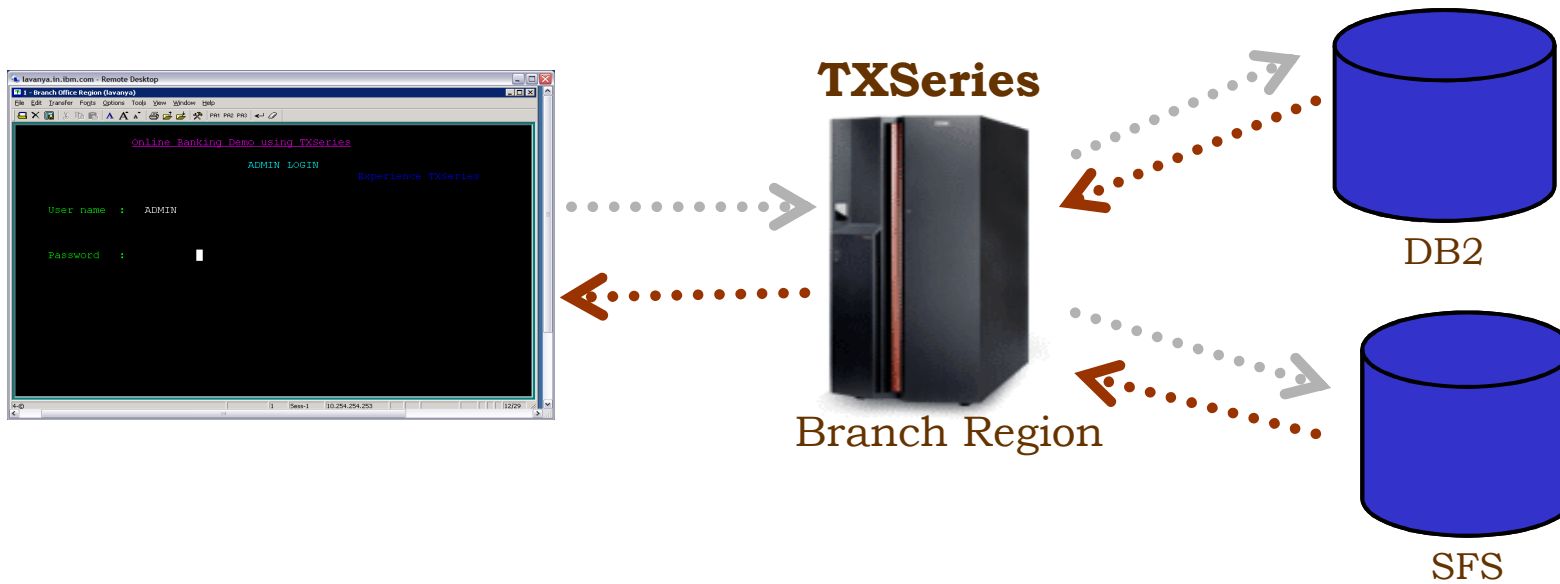
USERID: BA0011

PASSWORD: BA0011

ACCNUM: HRGNBRGN00000011

F3 - Back to Menu

Behind the scenes...



Admin provides the new account details to the customer

http://lavanya.in.ibm.com:9080/txseries/TXBankApp - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://lavanya.in.ibm.com:9080/txseries/TXBankApp



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Internet Banking Login

User ID BA0000

Password

Account Type SavingsAccount

Submit



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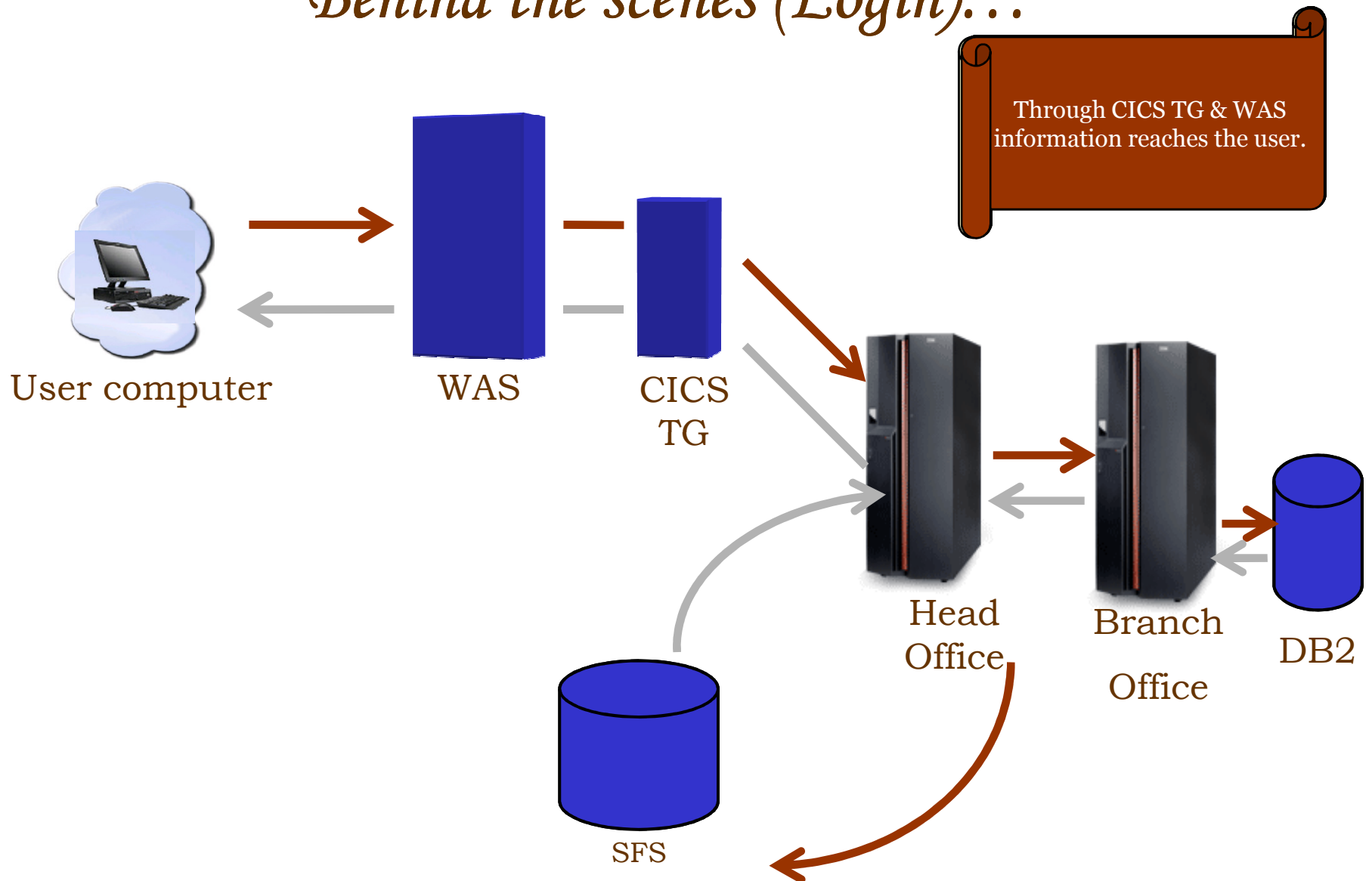
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Done

Local intranet

User "BA0000"
wants to operate his
online banking facility.

Behind the scenes (Login)...





Online Banking Demo using TXSeries

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Welcome BA0000

Account Summary

UserName	BA0000
Account Number	HRGNBRGN00000000
Account Balance	Rs 19195.00

[View mini statement](#)

On successful login the Basic Account Details of the user are displayed.

User opts to view mini statement of the account.

The user can also perform three types of online transactions: Deposit Money, Withdraw Cash or Transfer Money.

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Account Details

UserName	BA0000
Account Number	HRGNBRGN00000000
Current Balance	Rs 19195.00

Last 5 Transactions Details:

TranID	Transaction Details	Date	Amount in Rs.
1285	Amount is Withdrawn from account	17-Jun-0008 14:14:38	123.00
1283	Amount is Withdrawn from account	17-Jun-2008 14:23:20	123.00
1282	Amount is Deposited to account	17-Jun-2008 14:14:34	10.00
1281	Amount is Withdrawn from account	16-Jun-2008 21:45:40	10.00
1266	Amount is Withdrawn from account	12-Jun-2008 18:11:25	123.00

Services Offered

Deposit

Withdraw

Transfer Funds

User opts to transfer some money.



Home



Logout

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Transfer Funds

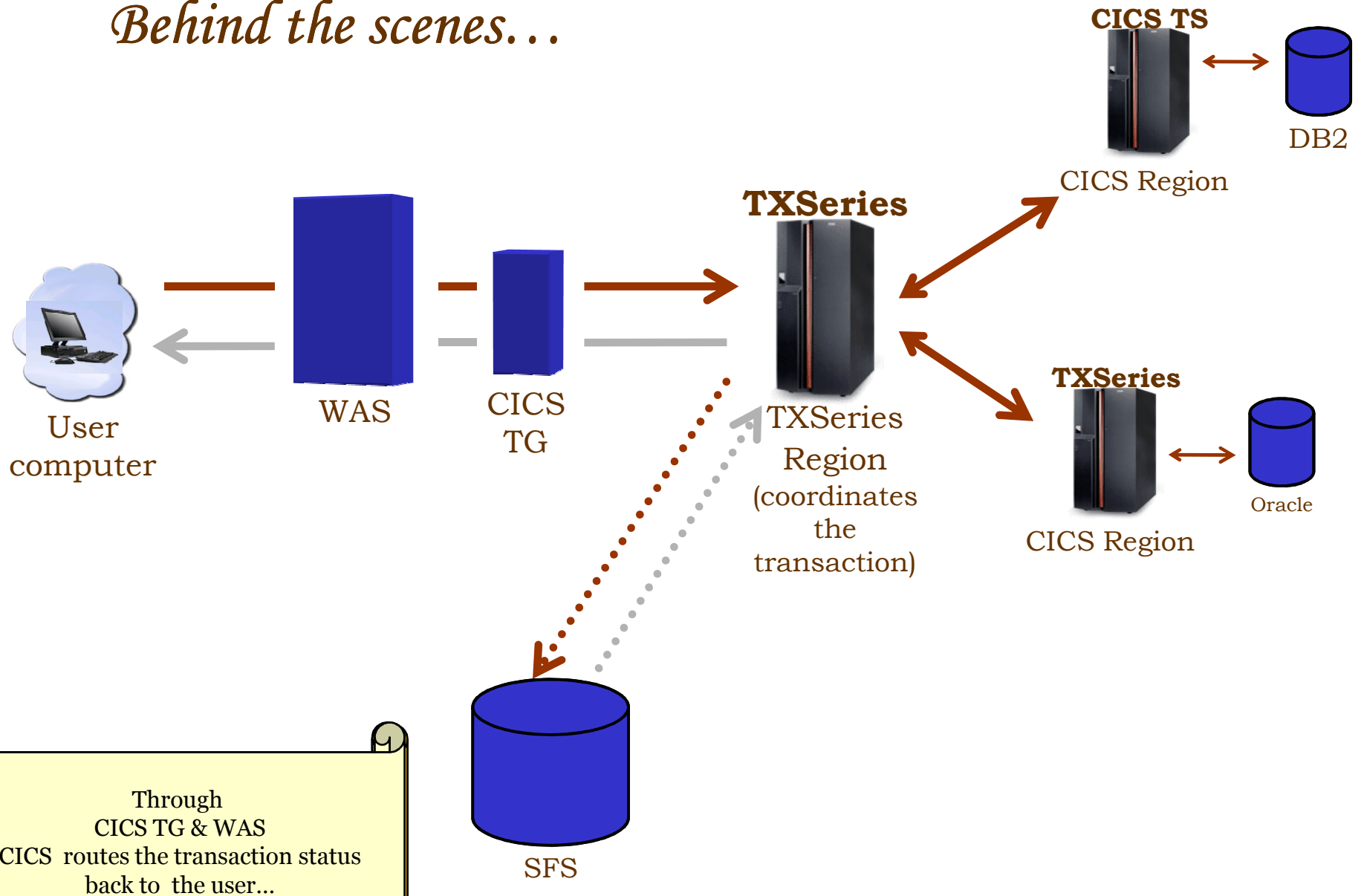
From Account Number	To Account Number
HRGNBRGN00000000	HRGNBRGN00000001

Amount to Transfer
100

Transfer	Cancel
----------	--------

User opts to transfer
Rs 100 to Account
HRGNBRGN00000001.

Behind the scenes...



Through
CICS TG & WAS
CICS routes the transaction status
back to the user...



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Transaction Status

Transaction status for Transfer is as given below

Transaction Status	
Name	BA0000
From Account Number	HRGNBRGN00000000
To Account Number	HRGNBRGN00000001
Amount Transferred	Rs 100.00
Transaction Status	Successfull
Transaction ID	1287

User opts to check the details of his account.

[Back - To account Details Page](#)



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User opts to logout.

Account Details

Account Number	BA0000
Card Number	HRGNBRGN00000000
Current Balance	Rs 19095.00

Last 5 Transactions Details:

TranID	Transaction Details	Date	Amount in Rs.
1287	Amount is Withdrawn from account	17-Jun-0008 14:27:33	100.00
1285	Amount is Withdrawn from account	17-Jun-2008 14:14:38	123.00
1283	Amount is Withdrawn from account	17-Jun-2008 14:23:20	123.00
1282	Amount is Deposited to account	17-Jun-2008 14:14:34	10.00
1281	Amount is Withdrawn from account	16-Jun-2008 21:45:40	10.00

Services Offered

Deposit

Withdraw

Transfer Funds

The user can now opt for other Services such as Deposit Money or Withdraw Cash.

User Logout's from his Account 😊

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Thank You. Please visit again

References

CICS Application Programming

Product Manual

CICS Application Programming Reference

CICS Application Programming Guide

<http://www.yelavich.com/history/ev199501.htm>

<http://www.mainframeweek.com/journals/articles/0001/Modern+CICS+application+development>

RDZ

Link for video on using RDz to work with JCA to TXSeries.

http://rational.dfw.ibm.com/atdemo/rdz/webservices/recorded/6.WDz_JCA_to_TXSeries_12Min_V1.zip

Link for article on Using TXSeries and RDz to build CICS applications

http://www.ibm.com/developerworks/websphere/library/techarticles/0703_madhu/0703_madhu.html



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Q & A

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Thank you

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