CICS Tools - working with VSAM data

(CICS VR, CICS BAC and CICS VC)

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WebSphere software

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Preface

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  ▸ CICS, CICS for MVS/ESA, CICS/ESA, CICSPlex SM

  ▸ DFSMS/MVS

  ▸ IBM

  ▸ MVS/ESA

  ▸ OS/390

  ▸ S/390, z/OS

  ▸ DFSMStvs, Transactional VSAM

- **Windows is a registered trademark of the Microsoft Corporation**

- **Pentium is a trademark of the Intel Corporation**

Agenda

- **CICS and Tools**
  - ▶ CICS TS
  - ▶ Tooling

- **CICS VSAM Recovery (CICS VR)**
  - ▶ Overview
  - ▶ Highlights of new CICS VR 4.1 release

- **CICS VSAM COPY (CICS VC)**
  - ▶ Overview

- **CICS Batch Application Control (CICS BAC)**
  - ▶ Overview
  - ▶ Recent enhancements

CICS and Tools - overview

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CICS Tools – to support your use of CICS TS

CICS Transaction Server V3 – Themes

CICS Integration — Enable the reuse of CICS applications within a flexible On Demand operating environment via standard interfaces and communication protocols.

Application Transformation — Enable the enhancement of existing applications, and construction of new applications, using contemporary programming languages, constructs and tools

Enterprise Management — Enable the effective management of large runtime configurations via modern user interfaces

www-306.ibm.com/software/htp/cics/tserver/v31

z/OS Tools for platform vitality

- **Commitment to the enterprise platform**
  - ▸ Investing in tools tools that compete in support of run-time CICS
  - ▸ Stimulating price-competition by offering high-value alternatives
  - ▸ Extending the portfolio to meet evolving customer needs

- **Tools for manageability of the CICS run-time**
  - ▸ Users tell us they are having to do more with fewer people
  - ▸ Skilled hires are difficult to find, take a long time to train
  - ▸ Applications and systems are becoming more and more complex

- **Helping with the paradigm shift in business environment**
  - ▸ Our customers are reacting to changes in the business environment
  - ▸ Line of business clients demanding adoption of new technology
  - ▸ Service-oriented architecture providing framework to satisfy

eServer zSeries tools

Servers

- WebSphere Application Server for zSeries
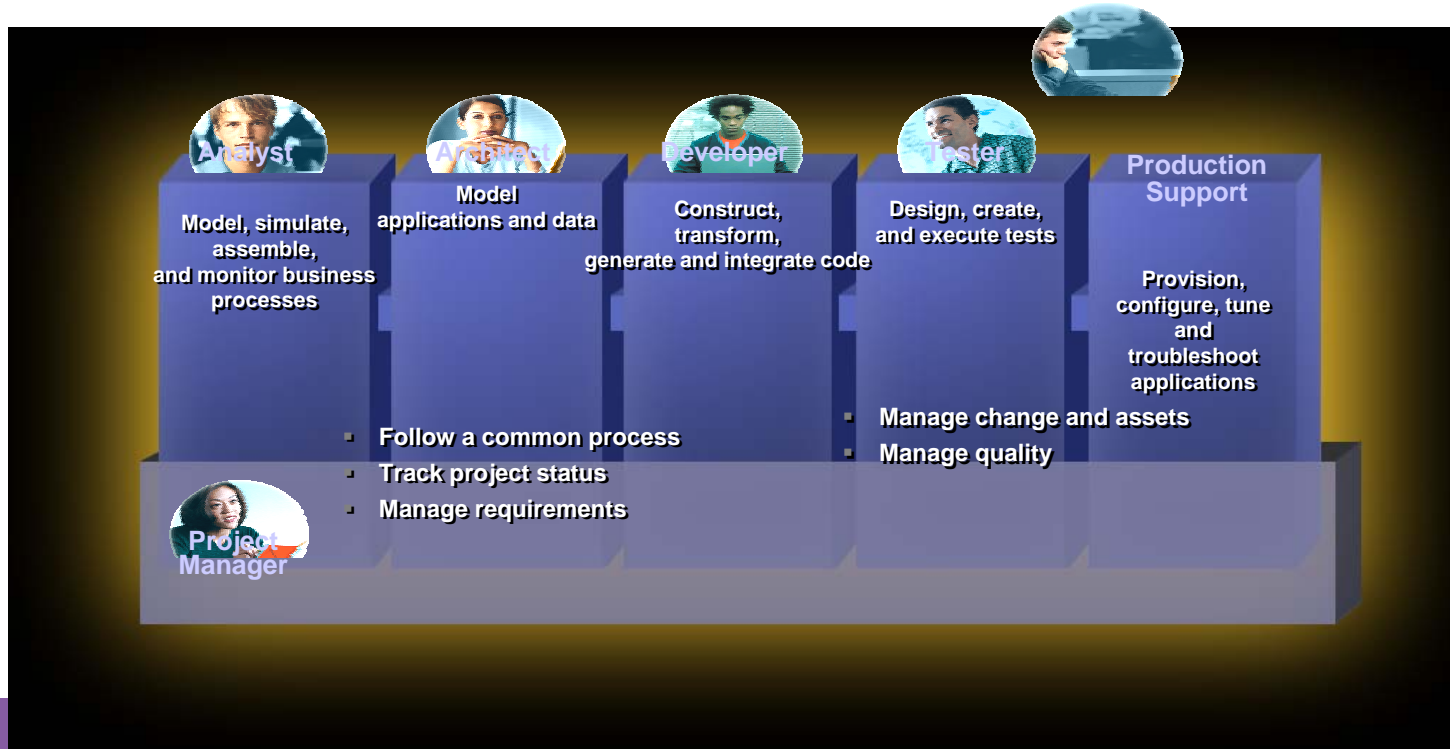- CICS
- IMS

Transformation tools

- WebSphere Application Monitor
- WebSphere Workload Simulator
- WebSphere Asset Analyzer
- WebSphere Enterprise Developer
- WebSphere Host On-Demand Connector
- WebSphere Host Access Transformation Server

Problem determination tools

- File Manager
- Fault Analyzer
- Debug Tool
- Application Monitor
- Workload Simulator

CICS tools

- CICS Business Event Publisher
- CICS Interdependency Analyzer
- CICS VSAM Transparency
- CICS Configuration Manager
- CICS Performance Analyzer
- OMEGAMON XE for CICS
- CICS VSAM Recovery
- CICS VSAM Copy
- CICS Batch Application Control
- IBM Session Manager
- CICS OTTO
- *CICS Performance Monitor*
- *CL/Supersession*
- *CL/Conference*

management

- Requisite Pro
- ClearQuest
- ClearCase
- SCLM

Analyst

Model, simulate, assemble, and monitor business processes

Architect

Model applications and data

Developer

Construct, transform, generate and integrate code

Tester

Design, create, and execute tests

Production Support

Provision, configure, tune and troubleshoot applications

- Follow a common process
- Track project status
- Manage requirements

- Manage change and assets
- Manage quality

Project Manager

CICS VSAM Recovery (CICS VR)
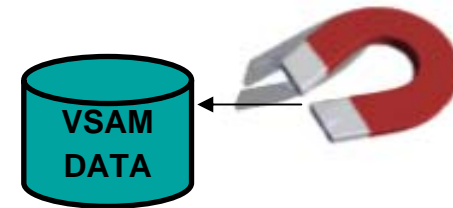
WebSphere software

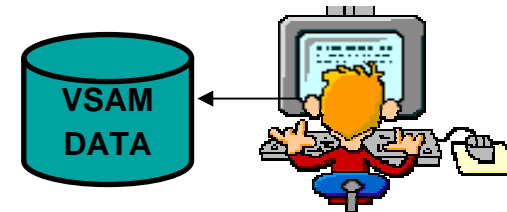*e* business on demand software

Why is data recovery needed?

- **Almost all CICS users update VSAM data sets online and/or in batch**
  - ▸ KSDS and ESDS most common

- **Physically corrupted**
  - ▸ Fire, flood, deletion, overwritten, etc.

- **Logically corrupted**
  - ▸ Incorrect transactions executed
  - ▸ Maliciously, accidentally, test/production error

CICS VSAM Recovery

- **Recovers updates made to a specified point-in-time by:**
  - ▶ For CICS transactions
    - CICS VR provides **forward recovery** support using CICS written forward recovery records
  - ▶ For Batch applications
    - CICS VR provides forward recovery logging and undo logging, and then…
    - Provides **forward recovery** and **backout** support using CICS VR-written log records

- **CICS VR helps:**
  - ▶ Reduce "downtime" when VSAM data is unavailable
  - ▶ Automate the recovery process

CICS VR support for backups

- **CICS VR supports the following IBM Backup products:**
  - ▶ DFSMSdss logical copies
  - ▶ DFSMSdss logical dumps
  - ▶ DFSMShsm logical backups
  - ▶ DFSMSdss and DFSMShsm backups made using the Backup While Open (BWO) facility
    - • Often referred to as "fuzzy backups"
  - ▶ IDCAMS REPRO

- **CICS VR also permits other (non-IBM) products to provide backups for recovery**
  - ▶ Support provided in CICS VR 4.1 and CICS VR V3.3 (through APAR PQ96621)
  - ▶ Support takes form of notification support and panel interface support

- NB. CICS VR does not support use of copies made by CICS VSAM Copy (CICS VC)
  - ▶ CICS VC copies are adhoc copies for use as test data or offline report generation
  - ▶ DFSMSdss and DFSMShsm provide superior backup capabilities for use as recovery backups

Manual recovery steps

- **Steps required to recover corrupted data sets manually:**

  1. Determine which data sets were corrupted
  2. Make the corrupted data sets unavailable for further updating
  3. Determine the latest backups that exist for the corrupted data sets
  4. Restore the backups
  5. Determine all transactions that updated the corrupted data sets since the backups were taken
  6. Rerun all appropriate transactions
  7. Verify data sets are valid and make them available for update

- **Disadvantages of manual recovery:**

  ▸ Manual daily record keeping

    • Track all backups, executed transactions, etc.

  ▸ User error

    • Restore incorrect backup, don't reapply all transactions, etc.

  ▸ Time

    • Determine corrupted data sets, backups, transactions, etc.

CICS VR recovery steps

- **Steps required to recover corrupted data sets with CICS VR:**

  - ▶ Determine which data sets were corrupted

  - ▶ Invoke the CICS VR panel interface to create and submit recovery job

- **Advantages of CICS VR recovery and the panel interface:**

  - ▶ No manual record keeping
    - CICS VR is notified of all necessary recovery information and stores it in a central repository

  - ▶ Less possibility of user errors
    - CICS VR automatically builds an appropriate recovery job requiring minimal user intervention

  - ▶ Drastically save time
    - CICS VR uses known recovery information to quickly build an appropriate recovery job
    - No need to resubmit transactions – CICS VR applies log records that were written during the initial execution of the transactions

CICS VR panel interface – Sample recovery parms.

Default values will restore sphere from latest logical backup and forward recover to current point in time

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CICS VR panel interface – Sample recovery job

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CICS VR history

- **CICS VR releases**
  - ▶ CICS VR V1 (5685-009) – MLC
    - • CICS VR 1.1 – August 1987

  - ▶ CICS VR V2 (5695-010) - MLC
    - • CICS VR 2.1 – June, 1991
    - • CICS VR 2.2 – February, 1994
    - • CICS VR 2.3 - September, 1996.   Withdrawn from service October, 2003

  - ▶ CICS VR V3 (5655-H91) - OTC
    - • CICS VR 3.1 - December, 2001.   Withdrawn from service April 30, 2005
    - • CICS VR 3.2 – February, 2003.   Refresh release March, 2004
    - • CICS VR 3.3 – Announced August 17, 2004   GA September 24, 2004

  - ▶ CICS VR V4 (5655-P30) – OTC
    - • CICS VR 4.1 – Announced October 18, 2005   GA December 9, 2005

CICS VR V3R1 highlights

- **CICS VR server address space**
  - ▶ DFSMSdss logical copy and dump support
    - • CICS VR notified by DFSMSdss
    - • CICS VR automatically restores DFSMSdss copies and dumps (in addition to DFSMShsm logical backups)

  - ▶ CICS VR VSAM batch forward recovery logging
    - • Logs updates made to non-RLS VSAM spheres by batch jobs
    - • No updates to batch jobs required
    - • CICS VR can now forward recover VSAM spheres from updates made by batch

- **Change accumulation**
  - ▶ Consolidates log records for quicker recovery

- **Enhanced disaster recovery support**
  - ▶ RCDS IMPORT/EXPORT utility allows you to run panel interface at remote recovery site

CICS VR V3R2 highlights

- **Improved VSAM sphere grouping**
  - ▸ Allows grouping of VSAM spheres for recovery using ISMF or by adding the names of VSAM spheres into a sequential data set

- **Selective forward recovery**
  - ▸ Select what log records do and do not get applied during forward recovery processing
    - • Based on the IDs of the log records
  - ▸ For example, you can "remove" all updates made by a particular transaction
  - ▸ Allows you to use CICS VR to recover VSAM spheres from logical corruption

- **Automatic LSR buffer space calculation and usage**
  - ▸ Improve the efficiency and performance of recovery processing

CICS VR V3R3 highlights

- **CICS VR batch UNDO Logging**
  - ▸ Logs updates made to non-RLS VSAM spheres by batch jobs
  - ▸ No updates to batch jobs required
  - ▸ CICS VR can now perform batch backout to removes updates made to VSAM spheres by failed batch job steps

- **CICS VR file copy notification service**
  - ▸ Allows CICS VR to be notified of VSAM backups made by any product (IBM or non-IBM)

- **CICS VR server address space and logging enhancements**
  - ▸ Allows further 24*7 availability, even when maintenance is required

- **Numerous usability enhancements**
  - ▸ Increased usability and ease-of-use features based on customer feedback
  - ▸ "CICS VR is the easiest VSAM recovery product to use" is a common compliment we receive

- **Continual disaster recovery enhancements**
  - ▸ New disaster recovery options based on customer requirements

CICS VR V4R1 – New Version - highlights

- **Allows automated recovery, with two complementary functions:**
  - Automated notification to CICS VR when backout failure is detected in CICS
    - Supports backout failures due to IOERROR, NOSPACE, or AIX Full

  - Optional automatic CICS VR recovery for online CICS VSAM data sets

- **Allows invocation of the backup process from the CICS VR panel interface:**
  - to allow both sharp (and fuzzy backups when enabled) to be taken

- **Preallocates the target data set prior to restoring from a backup**
  - to support REPRO backups and other backup types where restore does not include dataset allocation

- **Provides authorization management for the panel interface**
  - to limit authorization for specific tasks by USERID

CICS VR V4R1 – New Version – highlights (continued)

- **Provides test-only forward recovery and backout**
  - ▶ To enable testing of recovery processes without affecting production data
  - ▶ Runs CICS VR without making updates to VSAM spheres

- **Disaster recovery report:**
  - ▶ To allow customers to review and validate what is needed at a remote site

- **Panel Interface usability enhancements including:**
  - ▶ Backup and help panel dialog improvements
  - ▶ Local/GMT switch support for the CICS VR registered backup names
  - ▶ Change Accumulation (CA) Autoderegistration Panel Support
  - ▶ Autoderegister criteria control from the CICS VR main menu

CICS VR V4R1 key requirements

- **Key Requirements the same as CICS VR 3.3:**

  - **z/OS 1.4 or higher**
    - Requires a set of APARs to use all function (mostly batch backout)
    - **z/OS V1.4 or higher:**
      - OA07602   OA07286   OA07287
      - OA07288   OA07289   OA07290
      - OA04114   OA04115   OA07548
      - OA07549   OA14114
    - **z/OS V1.5**
      - Replace OA04114 and OA04115 with OA08157
    - **z/OS V1.7**
      - Also apply OA14338

- **All currently supported CICS TS releases are supported by CICS VR**
  - **The following APARs are required to use CICS VR VSAM batch logging**
    - CICS TS 1.3   PQ50900 and PQ91812
    - CICS TS 2.2 and 2.3   PQ91809
    - CICS TS 3.1   no apar required
  - **CICS/ESA 4.1 no longer supported**
    - Previous CICS VR support for CICS/ESA 4.1 removed from the product
    - CICS V4 documentation removed

- See CICS Tools web page: http://www-306.ibm.com/software/htp/cics/vr/

CICS VSAM Copy for z/OS

CICS VSAM Copy for z/OS – Version 1.1

- Announced June 8th, 2004
  - GA: June 25th, 2004

- **What does it do?**
  - Creates CONSISTENT copies of VSAM data sets
    - While they remain online and open to CICS for update
    - While they are closed to CICS

- **Why do I need it?**
  - Create ad-hoc copies of VSAM data sets
    - Without affecting current performance of running CICS applications
    - Produced copies are consistent (no incomplete units of work)
    - Ad-hoc copies – not backup copies
      - DFSMS and DFSMSDSS functionality superior for backup copies
  - Work towards 24*7 VSAM availability
    - No need to take the data sets offline from CICS before creating copies

Currently available offline copy tools

- **Offline copy tools**

	CICS Applications		Offline Copies	CICS Applications
	TRANS 1	TRANS 2		TRANS x
	TRANS 3	TRANS 4	TRANS 5		TRANS y
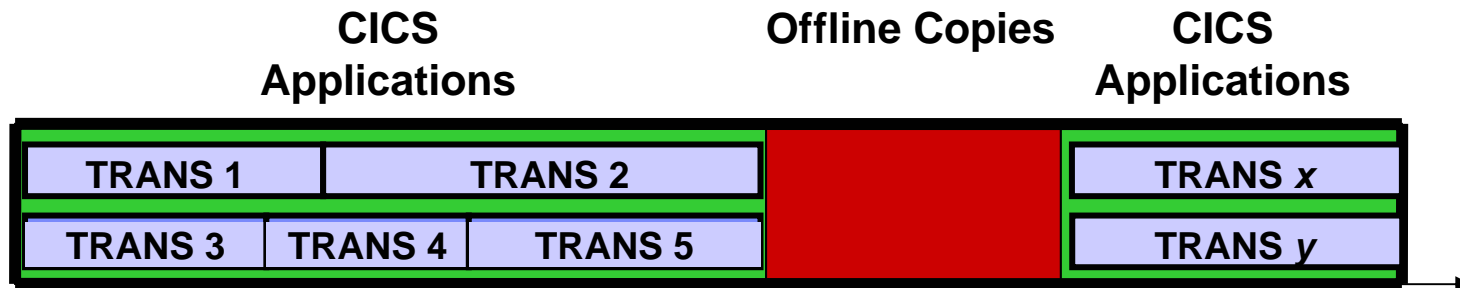
- **Advantages**
  - ▶ Consistent copies produced (no incomplete units of work)
  - ▶ Often fast and robust (multiple copies in one run)
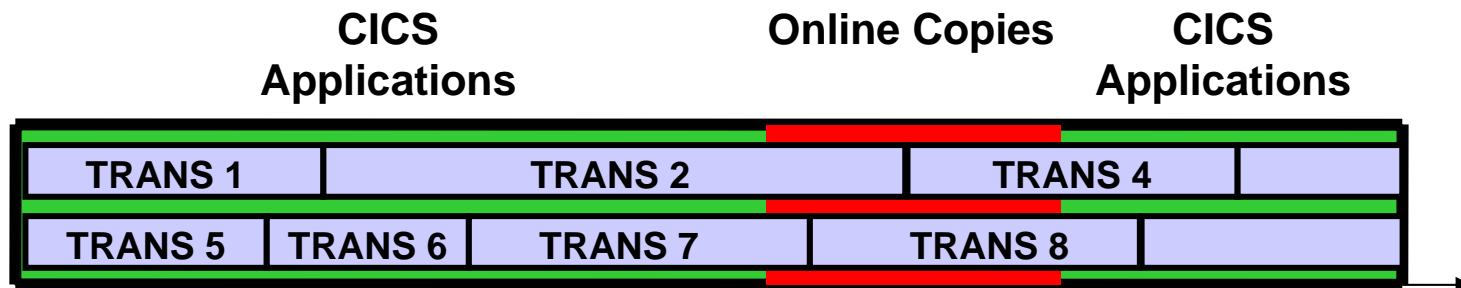
- **Disadvantages**
  - ▶ Must take data sets offline from CICS
  - ▶ Usually must be scheduled in advanced

Currently available online copy tools

- **Online copy tools**

	CICS Applications		Online Copies	CICS Applications	
TRANS 1	TRANS 2			TRANS 4	
TRANS 5	TRANS 6	TRANS 7		TRANS 8	

- **Advantages**
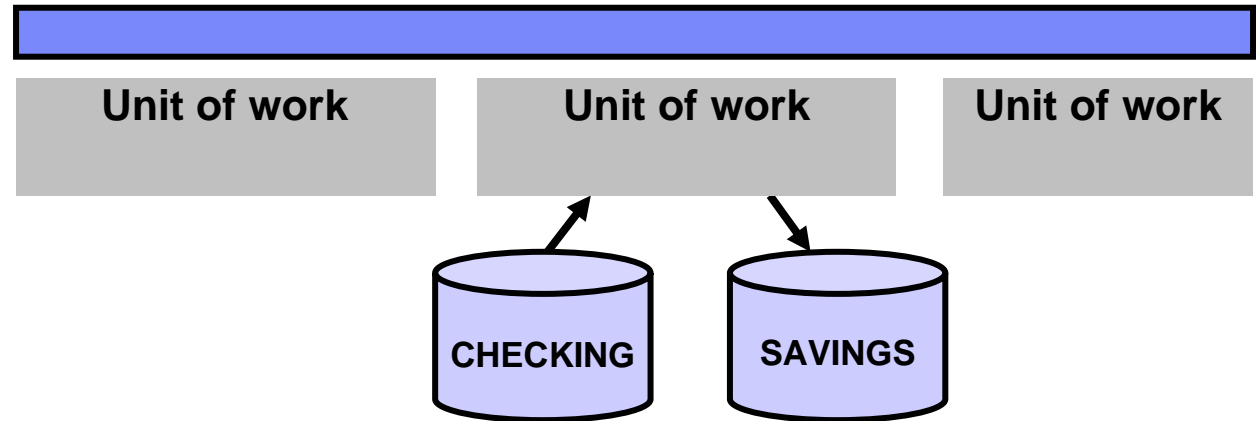 - ▶ Data sets remain online to CICS for update

- **Disadvantages**
  - ▶ Produced copies may be fuzzy (incomplete units of work included)
  - ▶ Fuzzy copies require forward recovery to make them consistent

Fuzzy status explained

CICS Transaction

Unit of work	Unit of work	Unit of work

CHECKING   SAVINGS

- **Other online copy products**
  - ▶ Copies could include debit from checking account but not the credit to savings account

- **CICS VSAM Copy for z/OS**
  - ▶ Copies will always be consistent (either all or none of the updates made by the unit or work)

  - ▶ All units of work in flight at the start of the copies will be included in the copies

CICS VSAM Copy for z/OS advantages

Best-of-both-worlds approach

- Creates *consistent* copies of VSAM data sets
  - Supports KSDS, ESDS, RRDS, VRRDS VSAM data sets
  - Copies VSAM KSDS base cluster plus alternate indexes (through base cluster)
- Create copies of data sets while they remain online to CICS for update
  - Automatically determines online/offline before copy (no intervention)
  - Takes offline copy if appropriate
- Copy multiple VSAM data sets in one run
- No degradation to performance of running CICS transactions

CICS VSAM Copy for z/OS requirements and references

- **Software requirements**
  - ▶ OS/390 2.10 or z/OS 1.3 or higher
  - ▶ CICS TS for OS/390 V1.3 or CICS TS for z/OS Version 2.2 , 2.3 or 3.1

- **Hardware requirements**
  - ▶ None specific to CICS VSAM Copy for z/OS

- **IBM CICS tools web site**
  - ▶ http://www-306.ibm.com/software/htp/cics/tools/

- **CICS VSAM Copy manuals**
  - ▶ CICS VSAM Copy for z/OS V1.1 User's Guide, SC34-6339
  - ▶ CICS VSAM Copy for z/OS V1.1 Program Directory, GI10-2579

CICS Batch Application Control for z/OS

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# CICS Batch Application Control for z/OS – Release 1

- Announced November 4th, 2004   GA: November 26th, 2004

- **What does it do?**
  - ▶ Controls the state of the following CICS resources from a batch job step
    - VSAM files
    - Transactions
    - Transient data queues
    - Programs

- **Why do I need it?**
  - ▶ Improve CICS availability and streamline batch window processing by automatically:
    - Deallocating resources prior to batch processing
    - Reallocating resources after processing completes
  - ▶ Reduce errors
    - Reduce user intervention to manually change the state of resources
    - Ensure resources are set to their proper state when CICS is restarted

Need for improved resource control

CICS	BATCH	CICS
	Payroll batch application | **Payroll report utility**	
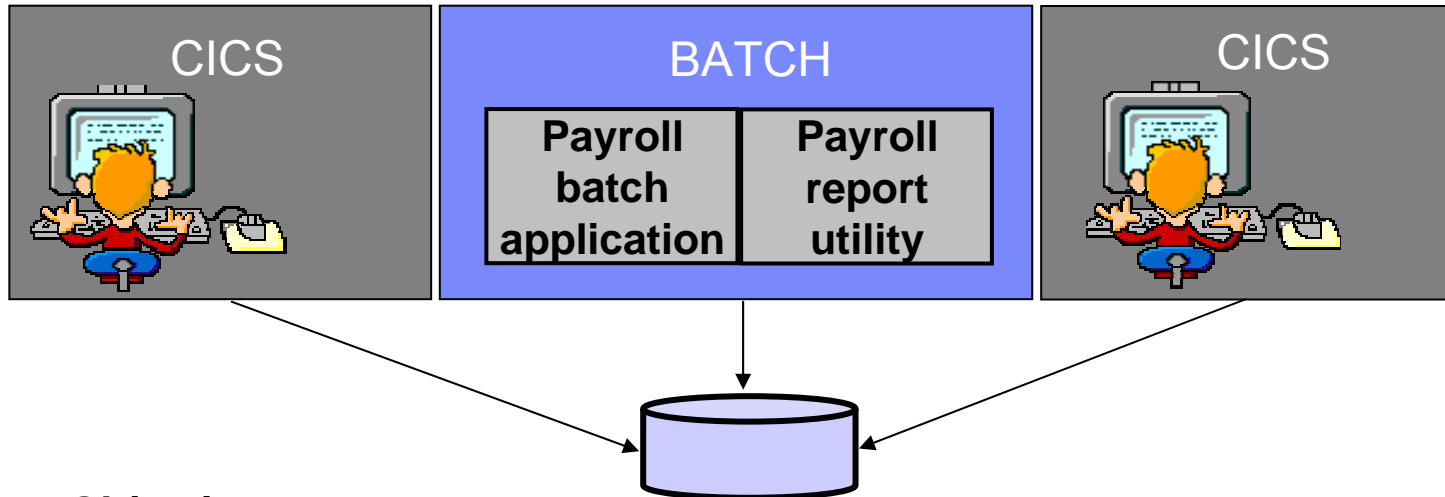
- **Objective**
  - ▶ Need a way to quickly change resource state to prevent
    - • CICS from allocating a resource that is being used by batch
    - • Batch from allocating a resource that is being used by CICS

- **Incorrect or inefficient resource control could cause**
  - ▶ Failure of applications
  - ▶ Incorrect changes to data
  - ▶ Incorrect results from application processing
  - ▶ Reduced online CICS availability

CICS Batch Application Control features

- **Resource state control**
  - ▶ Simple command language allows you to manipulate state of resources from a batch job step
  - ▶ From a batch job step, you can also
    - • Link to a CICS program passing a COMMAREA
    - • Start a CICS transaction passing data
    - • Issue any CEMT command

- **Graphical user interface**
  - ▶ Allows for grouping of resources
    - • The state of all resources in a group then can be controlled by a single command in a batch job step
  - ▶ Allows for control over various CICS BAC region and resource options
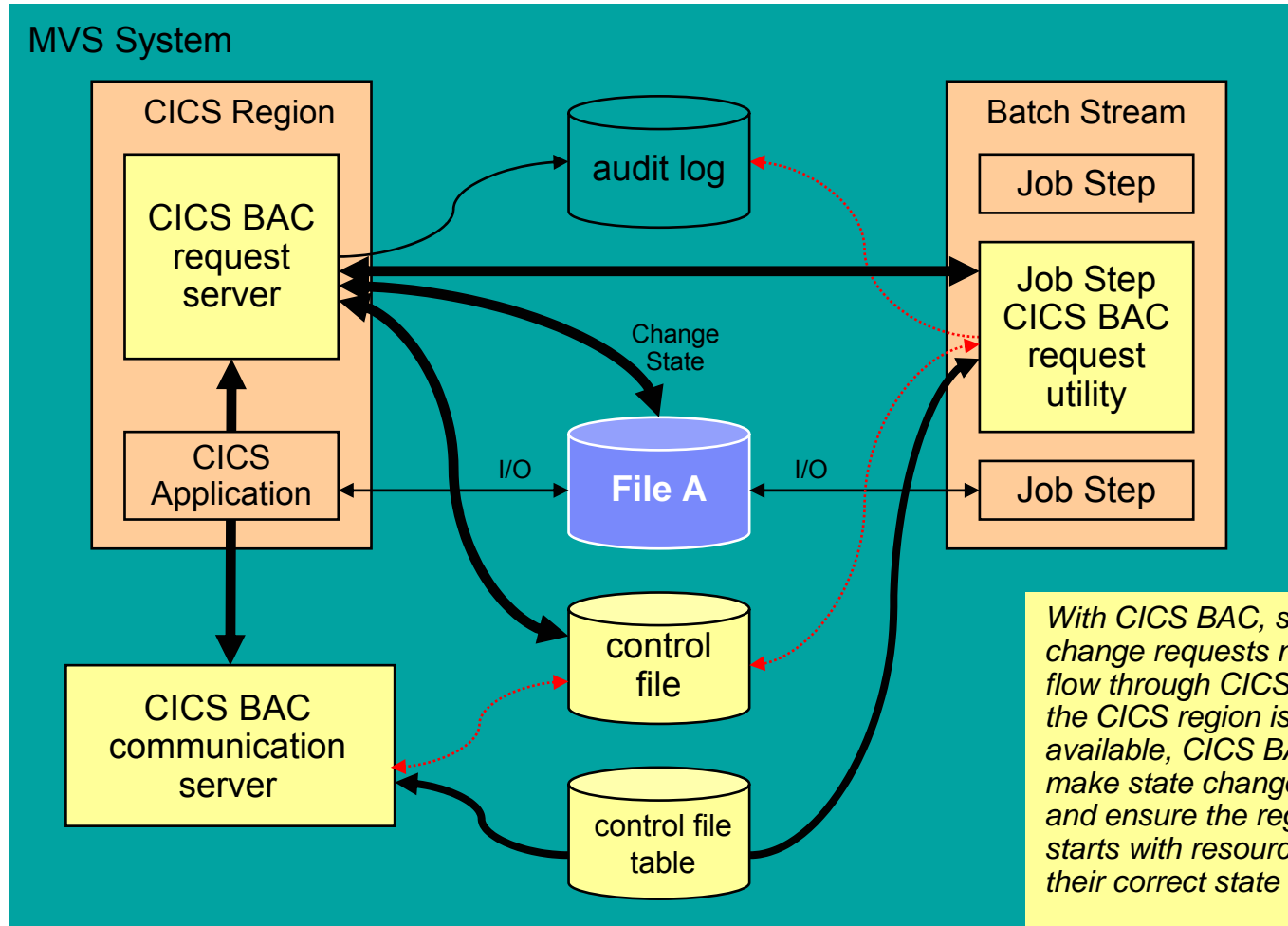
- **Global resource state change tracking**
  - ▶ Tracks state changes to resources made by CEMT, batch, CICS SPI, etc.

- **CICS independence**
  - ▶ Can record state change requests from batch even when CICS is not active
  - ▶ Can ensure resources are set to their last requested state when CICS is restarted

CICS Batch Application Control architecture

In this diagram CICS BAC coordinates state changes to File A so that CICS applications and batch jobs can use the file as necessary

MVS System

CICS Region

CICS BAC request server

audit log

CICS Application

Change State

Batch Stream

Job Step

Job Step CICS BAC request utility

Job Step

I/O   **File A**   I/O

CICS BAC communication server

control file

control file table

With CICS BAC, state change requests normally flow through CICS, but if the CICS region is not available, CICS BAC will make state changes itself and ensure the region starts with resources in their correct state

CICS Batch Application Control scenario

- **Payroll application scenario**
  - ▶ A set of resources (files, transient data queues, transactions, and programs) all related to payroll information are defined to CICS
  - ▶ We need to run a payroll batch application that writes to the same files that are defined to CICS
  - ▶ We need a way to deallocate payroll resources from CICS prior to batch processing and reallocate the resources after batch processing

- **Steps to deallocate/reallocate resources for a payroll batch application using CICS BAC**
  - ▶ Add all CICS resources related to payroll into a CICS BAC application group
  - ▶ Close and disable all resources to CICS prior to running the batch application (prevent CICS access and allow batch access)
  - ▶ Open and enable all resources to CICS after successful completion of the batch application (allow CICS access and prevent batch access)

CICS Batch Application Control scenario

Can dynamically retrieve a list of resources defined to CICS and add them to an application group
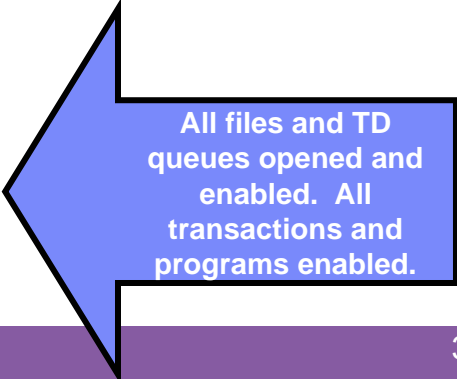
CICS Batch Application Control scenario

```
//CBKSAMP  JOB 1,USERID,CLASS=A,MSGCLASS=H,NOTIFY=&SYSUID
//DEALLOC  EXEC PGM=CBKBMAIN
//STEPLIB  DD DISP=SHR,DSN=CICSTOOL.CBK.V1R1P.LOAD
//CBKPARMS DD DISP=SHR,DSN=CICSTOOL.CBAC.PARMLIB
//SYSABEND DD SYSOUT=*
//CBKPRINT DD SYSOUT=*
//CBKIN    DD *
*
* DEALLOCATE PAYROLL RESOURCES ON CICS REGION IYCYZC2E
*
  DEFAULT CICS(IYCYZC2E)
  SET GROUP(PAYROLL),OPENSTATUS(CLOSED),ENABLESTATUS(DISABLE)
/*
.
.

PAYROLL BATCH APPLICATION
.
.

//REALLOC  EXEC PGM=CBKBMAIN
//STEPLIB  DD DISP=SHR,DSN=CICSTOOL.CBK.V1R1P.LOAD
//CBKPARMS DD DISP=SHR,DSN=CICSTOOL.CBAC.PARMLIB
//SYSABEND DD SYSOUT=*
//CBKPRINT DD SYSOUT=*
//CBKIN    DD *
*
* REALLOCATE PAYROLL RESOURCES ON CICS REGION IYCYZC2E
*
  DEFAULT CICS(IYCYZC2E)
  SET GROUP(PAYROLL),OPENSTATUS(OPEN),ENABLESTATUS(ENABLE)
/*
```

All files and TD queues closed and disabled. All transactions and programs disabled.

All files and TD queues opened and enabled. All transactions and programs enabled.

Additional CICS Batch Application Control features

- **Control resource states as a group or individually through GUI**
  - ▶ Add resources to CICS BAC application groups
  - ▶ Add CICS BAC application groups to CICS BAC application lists for each CICS region
  - ▶ Associate programs/transactions with files and transient data queues
  - ▶ Change the state of all resources as a group or individually

- **Audit log**
  - ▶ Reports CICS resource state change requests
  - ▶ Reports before, requested, and after states of affected resource

- **Additional file resource definition changes supported**
  - ▶ Change associated data set name
  - ▶ Change add, update, delete, read, and browse attributes
  - ▶ Change disposition

- **Migration utility**
  - ▶ Sample program provided to convert commands from a similar product (in-house or vendor) into CICS BAC syntax
  - ▶ Requires modification to work with your current resource control product

CICS Batch Application Control for z/OS requirements and references

- **Software requirements**
  - ▸ OS/390 2.10 or z/OS 1.3 or higher
  - ▸ CICS TS for OS/390 V1.3 or CICS TS for z/OS 2.2, 2.3 or 3.1

- **Hardware requirements**
  - ▸ TCP/IP connectivity between host mainframe and workstation running the CICS BAC client

- **Workstation requirements**
  - ▸ An Intel-based PC (or compatible) with at least a Pentium III processor and 256 MB RAM
  - ▸ 20 MB of available disc storage
  - ▸ Windows 2000 Professional or Windows XP Professional operating system

- **IBM CICS tools web site**
  - ▸ http://www.ibm.com/software/htp/cics/tools/

- **CICS Batch Application Control manuals**
  - ▸ CICS Batch Application Control for z/OS User's Guide, SC34-6321-01
  - ▸ CICS Batch Application Control for z/OS Workstation User's Guide, SC34-6322-00

CICS Tools working with VSAM data - Summary

- **CICS Vsam Recovery (CICS VR)**
  - ▶ Recovers VSAM data that was: Physically corrupted, Logically corrupted
  - ▶ Brand new CICS VR 4.1 gives:
    - increased automation with CICS
    - More day to day uses

- **CICS Batch Application Control (CICS BAC)**
  - ▶ Improves CICS availability and streamline batch window processing by automatically:
    - Deallocating/reallocating resources before/after batch processing
  - ▶ Reduces errors
    - Reduce user intervention to manually change the state of resources
    - Ensure resources are set to their proper state when CICS is restarted

- **CICS Vsam Copy (CICS VC)**
  - ▶ Create ad-hoc copies of VSAM data sets
    - Without affecting current performance of running CICS applications
    - Produced copies are consistent (no incomplete units of work)
    - Ad-hoc copies – not backup copies

zOS Tools from IBM

- **Websphere and zSeries tools**
  - **http://www-306.ibm.com/software/info1/websphere/index.jsp?tab=landings/zadportal**
- **Tivoli Tools**
  - **http://www-306.ibm.com/software/tivoli/sw-atoz/**
- **IBM Storage and system management software**
  - **TotalStorage Virtualization (SAN software)**
  - **Storage infrastructure management (Productivity Center)**
  - **IBM Tivoli® Hierarchical storage management**
  - **IBM Tivoli® Recovery and Archive management**
- **CICS Tools**
  - **http://www-306.ibm.com/software/htp/cics/tools/**
- **PD Tools**
  - **http://www-306.ibm.com/software/sw-bycategory/subcategory/SW780.html**
- **IBM Database Tools**
  - **Extensive IMS and DB2 tool set**
  - **http://www-306.ibm.com/software/data/db2imstools/**

IBM Storage Management tools

▸ **IBM Storage and system management software**

- **TotalStorage Virtualization (SAN software)**
- **Storage infrastructure management (Productivity Center)**
- **IBM Tivoli® Hierarchical storage management**
- **IBM Tivoli® Recovery and Archive management**

▸ **DFSMS product, with rich feature set, including**

- DFSMSdfp – storage, data and device management, plus copy services, including extended remote copy and concurrent copy
- Hierarchical Storage Manager (DFSMShsm) and Data Set Services (DDFSMSdss)
- Transactional VSAM (DFSMStvs)

▸ **IBM TotalStorage Management Toolkit, including**

- Complementary tooling from Mainstar Software Corporation

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June 12 – 16, 2006
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