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IBM System z9 主机的新型特殊处理器 - zIIP



zIIP (System z9 Integrated Information Processor) 是 IBM System z9 主机上使用的一款特殊处理器，适用于 System z9 EC (Enterprise Class) 和 System z9 BC (Business Class) 两种机型。zIIP 可以释放主机上的通用计算容量，减少特定数据计算和交易处理的总体成本，以及在主机上进行网络加密工作等。zIIP 能够更好地集中主机上的数据，帮助清除在主机交易数据存储与分布式系统上的应用之间的障碍。利用 zIIP 功能，System z9 主机就可以最大程度地减少维护数据多重拷贝的需要，并在应用和数据之间提供更好的安全保护。

从概念上来说，zIIP 与 zAAP (System z Application Assist Processors) 非常相似。但是与标准的 CPs、ICFs 以及 IFLs 不同，zIIP 不能独立工作。它们不能执行 IPL (Initial Program Load)，只能协助通用处理器 CP (Central Processor) 执行一些适当的工作。

适用于 zIIP 的工作负载

目前，DB2 UDB V8 和 DB2 9 for z/OS 的特定类型的工作，以及一些 z/OS Communication Server 的处理都可以使用 zIIP。此外，IBM 已经计划启动 z/OS 中的 z/OS XML System Services 以充分利用 zIIP。

zIIP 在 DB2 UDB V8 和 DB2 9 中的开发利用

目前，有以下三类 DB2 for z/OS 工作可以从 zIIP 中获益：

- ERP 或 CRM 应用服务

对于运行在 z/OS、UNIX、Intel 或 z 主机上 Linux 中的应用，通过 TCP/IP 连接，以 DRDA 的方式访问 z9 主机上的 DB2 for z/OS V8，DB2 给 z/OS 必需的信息可以使这些 SQL 请求直接运行在 zIIP 中。

• 数据仓库应用 (Data Warehousing applications)

对于将 DB2 for z/OS 用于长时间运行的并行查询 (Long Running Parallel Queries) (包括星型结构的并行查询) 来说，在 DB2 给 z/OS 必需的信息的时候，可以使这些 SQL 请求直接运行在 zIIP 中。这些查询在 Data Warehousing 实施中都是非常典型的。对 Data Warehousing 来说，选择长时间运行的并行查询可以为 DB2 用户提供更多的机会来优化其环境，同时充分利用 z9 主机和 DB2 提供的优质服务。

• DB2 for z/OS V8 utilities

在批量期间用于维持 Index Maintenance 结构 (LOAD、REORG、REBUILD INDEX) 的部分 DB2 Utility 功能可以运行在 zIIP 中。

zIIP 在 z/OS Communication Server 中的开发利用

z/OS Communications Server 允许部分 IPsec 的处理利用 zIIP，特别是以下部分：

- 利用 IPsec 的端到端加密 - 使用 zIIP Assisted IPsec 功能可以把部分 IPsec 处理工作从通用处理器转移到 zIIP 中。除了执行加密处理以外，zIIP 还执行信息完整性的密码验证 (Cryptographic Validation) 以及进行 IPsec Header 的处

理。这种功能在 2007 年 8 月，可通过安装 PTF 在 z/OS V1.8 上使用。z/OS V1.9 自带该功能，所以可在 z/OS V1.9 上使用。

前期准备

为了帮助规划 zIIP，z/OS 的一些组件已被增强，用来报告预期与实际的 zIIP 使用。

预期使用功能（PROJECTCPU）用来收集那些潜在的，可执行在 zIIP 上的代码所消耗 CPU 时间的相关信息。这种信息可以从生产 Workload 或代表性的 Workload 中收集，从而了解目前应用可在 zIIP 中运行的潜力。

百硕专家可以在收集和了解该信息方面提供帮助，确定您的应用是否适合在 zIIP 中运行。

直接在 z/OS 中设置 IEAOPTxx Parmlib Member 选项 PROJECTCPU=YES，记录适合 zIIP（和 zAAP）处理器的工作量。SMF Record Type 72 subtype 3 被放入 RMF Post Processor 中。Workload Activity Report 列出了 WLM Service Class 的工作量。该报告的域“APPL% IIPCP”是指可以适用于一个 zIIP 处理器的百分比，（而 APPL% AAPCP 是指可以适用于 zAAP 处理器的百分比）。SMF Record Type 30 提供了指定 Address Spaces 的更详细信息。因为 zIIP 和 zAAP 特殊处理器的价格低于通用处理器，当 APPL% AAPCP 或 AAPL% IIPCP 的值为 25% 时，就可以使用一个新的 zAAP 或 zIIP，并发挥出它们的价值。

对已经安装了 zIIP 的客户来说，该报告功能可以提供当前 zIIP 的执行信息，用来优化当前配置或帮助预测未来潜在的使用情况。

常规使用和预期使用监控功能只适用于安装了 APARs 的 z/OS V1.6 或更高版本。关于如何安装 APAR 的更多信息，可以参考 z/OS V1.6/V1.7 的 Program Director for IBM System z9 Integrated Information Processor Support，z/OS e V1.6/V1.7 Web Deliverable，以及适当的 zIIP PSP Buckets。

（需要注意的是 z/OS V1.6 的服务截至日期为 2007 年 9 月 30 日）。

zIIP 的 PROJECTCPU 使用和监控功能的支持是 z/OS V1.8 的基本组成部分。

IBM 已经出版了白皮书《Capacity Planning for zIIP-Assisted IPsec》，用来帮助规划 zIIP Assisted IPsec。z/OS Communication Server 的增强功能可以让 IPsec 的处理利用 zIIP，实际上是把 zIIP 变成一个高速加密的引擎。

使用要求

硬件

对 System z9 EC 和 BC 机型来说，都可以购买并安装 zIIP。根据购买日期不同，可能需要额外的 MCL 维护和 HMC 驱动。

z/OS 对 zIIP 的支持

可以通过从网站提供的 PTF，实现 z/OS V1.6 和 V1.7 对 zIIP 的支持。为了获得 zIIP 开发的服务要求，您必须使用下列 PSP Bucket 的服务。该服务适用于 Web Deliverable 软件，而且即使没有安装 HW Feature 也必须使用这种服务（例如，通过 zIIP Web Deliverable 来使用 PROJECTCPU）。

1. 硬件 Buckets 确定了 z9 EC 和 z9 BC 机型对 z/OS 和 z/OS e for z9 BC 硬件与软件要求。在安装 Web Deliverable 的时候，应当使用 zIIP 开发的信息。升级与 Subset 的名称如下：

For z9 EC: Upgrade = 2094DEVICE,
Subset = 2094/ZOS

For z9 BC: Upgrade = 2096DEVICE,
Subset = 2096/ZOS

2. Software Buckets 包括为 Web Deliverable FMIDs 推荐的服务，可能是也可能不是 zIIP 特定的（此信息是 HW Buckets 的补充，而不是替代）。Subset “BCPZIIP”（Upgrade: z/OS V1R6 & z/OS V1R7）

包括为 zIIP FMIDs (JBB77S9 for V1.6 和 JBB772S for V1.7) 推荐的所有服务。

3. 为了简化确认支持 zIIP 所需要的 PTFs, 已经创建了一个称为 zIIP 的功能型 PSP Bucket. 访问这个 PSP Bucket, 您可以参考 Technical Help Database for Mainframe Preventive Service Planning Buckets 和 Enhanced PSP Tool.

z/OS V1.8 对 zIIP 的支持已经成为 z/OS V1.8 的一个基本组成部分。

DB2 对 zIIP 的支持

第一个使用 zIIP 的是 IBM DB2 for z/OS V8, 通过安装 PTF 实现对 zIIP 的支持。(支持 DB2 的 PTF 在上述 PSP Buckets 中已经提到)。DB2 9 for z/OS 对 zIIP 的支持已经成为 DB2 9 for z/OS 的基本组成部分。

一旦实施以后, 我们便希望对于应用来说, DB2 在 zIIP 中能够实现透明及自动运行。使用 DB2 for z/OS V8 DRDA 的应用、长时间运行的并行查询以及用于维护 Index Maintenance 结构 (LOAD、REORG 和 REBUILD INDEX) 的部分 DB2 Utility 功能都无需进行任何前期变更。

z/OS Communication Server 支持 zIIP 的使用

2007 年 8 月, 通过安装 PTF, 就可以在 z/OS V1.8 上使用 zIIP-assisted IPsec 了。

- z/OS V1.8 Communications Server PTF (APAR PK40178)
- z/OS V1.8 PTF (APAR OW20045)

以下 TCP/IP Profile 里的配置语句, 触发 z/OS Communications Server 请求 z/OS, 将 IPsec Enclave SRB 处理分派在 zIIP 中运行。

- PCONFIG IPSECURITY (Enabling IPsec support for IPv4)
- IPCONFIG6 IPSECURITY (Enabling IPsec support for IPv6)
- GLOBALCONFIG zIIP IPSECURITY (Enables eligible work to be directed to zIIP)

对于使用 z/OS Communication Server for zIIP-assisted IPsec 的应用来说, 无需进行任何前期变更。当 z/OS V1.9 可用的时候, IBM 计划将 zIIP-assisted IPsec 整合在其中。

Using RACF Security with DB2



百硕外籍技术专家 Darryn Salt

Introduction

The RACF access control module allows you to use RACF in addition to DB2 authorization checking for DB2 objects, authorities, commands, and utilities. Instead of using traditional DB2 GRANT and REVOKE SQL statements such as GRANT SELECT ON TABLE TAB01 TO USER1, you can choose to use RACF commands to perform the same function.

This article will outline what is involved in introducing RACF security into your DB2 environment and what you should consider before making any move to RACF.

Why use RACF for DB2 security?

IBM is not “forcing” you to move to RACF security for DB2 so why would you want to use it? Here are some benefits:

- Allows consolidation of security administration. Have a centralized team to administer all security.
- Puts data security in the hands of the security experts. The RACF team are the security experts – not the DBA's.
- Validate auth IDs before granting DB2 authorities. Privileges and authorities cannot be given to invalid or non-existent IDs.
- Define security rules before object is created. With DB2 security the DB2 object must exist before the privilege can be granted.
- Preserve security rules for dropped objects. With DB2 security the privilege disappears when the object is dropped.
- Control and audit resources for multiple DB2 subsystems from single point.
- Administer DB2 security with a minimum of DB2 skill. Your valuable DBA's time does not need to be used for routine security tasks.
- Eliminate DB2 cascading revoke. With DB2 security a revoke of an ID's authority will automatically revoke the subsequent authorities granted by that ID – this can be inconvenient if not managed properly.

Overview of DB2 Privileges and Authorities

DB2 objects have privileges that are GRANTED using DCL (Data Control language), similar to the following:

```
GRANT SELECT ON TABLE XYZ TO PUBLIC
```

```
GRANT EXECUTE ON PLAN XYZ TO PUBLIC
```

You may be familiar other DB2 objects and their privileges:

DB2 Object	Privilege
SYSTEM	ARCHIVE, BINDADD, BINDAGENT, BSDS, CREATEALIAS, CREATEDBA, CREATEDBC, CREATESG, CREATETMTAB, DISPLAY, MONITOR1, MONITOR2, RECOVER, STOPALL, STOSPACE, TRACE
DATABASE	CREATETAB, CREATETS, DISPLAYDB, DROP, IMAGCOPY, LOAD, RECOVERDB, REORG, REPAIR, STARTDB, STATS, STOPDB
COLLECTION	CREATE IN
BUFFERPOOL	USE

DB2 Object	Privilege
STOGROUP TABLESPACE	
PLAN	BIND, EXECUTE
PACKAGE	BIND, COPY, EXECUTE, ALL

In addition to object privileges, DB2 has a set of system and database authorities:

DB2 system authorities:

- **SYSADM** has all DB2 privileges - GRANT SYSADM TO USER1
- **SYSCTRL** has all DB2 privileges except those which read or modify user data
- **SYSOPR** is allowed to issue most DB2 commands and to end utilities

DB2 database authorities:

- **DBADM** has the DB2 privileges required to control a data base. Allowed to manipulate any table within the database - GRANT DBADM ON DATABASE XYZ TO USER1
- **DBCTRL** has the DB2 privileges required to control a data base and run utilities against the data base
- **DBMAINT** is allowed to work with certain objects and run certain utilities on a data base

Using RACF

RACF commands are used to administer DB2 security. The best way to show this is by way of examples:

Table privileges example:

Create a RACF profile for SELECT on table DSN8810.EMP for DB2 members in Data Sharing group DB1G

```
RDEF MDSNTB 'DB1G.DSN8810.EMP.SELECT' UACC(NONE)
```

Permit a TSO user or group of users to read data in this table

```
PE 'DB1G.DSN8810.EMP.SELECT' CLASS(MDSNTB) ID(USER1) ACC(READ)
```

To give SELECT access to PUBLIC

```
RDEF MDSNTB 'DB1G.DSN8810.EMP.SELECT' UACC(READ)
```

To give all privileges on the table to PUBLIC

```
RDEF MDSNTB 'DB1G.DSN8810.EMP.*' UACC(READ)
```

Package privileges example:

Create a RACF profile that restricts execution of a package

```
RDEF MDSNPK 'DB1G.COLL1.PACKXYZ.EXECUTE' UACC(NONE)
```

Allow batch job BTCH01 to execute this package

```
PE 'DB1G.COLL1.PACKXYZ.EXECUTE' CLASS(MDSNPK) ID(BTCH01) ACC(READ)
```

Allow unrestricted execution of all packages in collection COLL1

```
RDEF MDSNPK 'DB1G.COLL1.*.EXECUTE' UACC(READ)
```

System authorities example:

Create a RACF profile for SYSADM

```
RDEF DSNADM 'DB1G.SYSADM' UACC(NONE)
```

Give a TSO user SYSADM authority

```
PE 'DB1G.SYSADM' CLASS(DSNADM) ID(USER1) ACC(READ)
```

Database authorities example:

Create a RACF profile for DBADM authority on database DBXYZ

```
RDEF DSNADM 'DB1G.DBXYZ.DBADM' UACC(NONE)
```

Give a TSO user DBADM rights on this database

```
PE 'DB1G.DBXYZ.DBADM' CLASS(DSNADM) ID(USER1) ACC(READ)
```

The above commands are all familiar to RACF administrators.

Implementing RACF Security

Getting RACF security up and running is quite a simple procedure:

Install the RACF access control module

- Source is in DSNRXAC member of SDSNSAMP library
- Change parameters in DSNRXAC if required
- Modify step 3 of the DSNTIJEX installation job to assemble the RACF access control module
- Resulting load module will go in the SDSNEXIT library
- Choose between Multi-Subsystem or Single Subsystem Scope
- Multi-Subsystem Scope (default)
 - ✓ One set of general resources classes can protect multiple subsystems
 - ✓ General resource names are prefixed with DB2 subsystem name
 - ✓ Classes provided by IBM in RACF CDT are multi-system scope
 - ✓ Protect multiple subsystems with single set of resource profiles
 - ✓ Fewer classes overall
 - ✓ Chosen by most installations
- Single Subsystem Scope (an option)
 - ✓ One set of general resources classes dedicated to one subsystem
 - ✓ General resource names are not prefixed with DB2 subsystem name
 - ✓ Classes must be defined by the installation
 - ✓ Segregates resources by subsystem
 - ✓ Fewer profiles per class

IBM supplies a set of RACF resource member classes:

- DSNADM administrative authority class
- MDSNBP buffer pool privileges
- MDSNCL collection privileges
- MDSNDB database privileges
- MDSNJR Java archive files (JARs)
- MDSNPK package privileges
- MDSNPN plan privileges
- MDSNSC schema privileges
- MDSNSG storage group privileges
- MDSNSM system privileges
- MDSNSP stored procedure privileges
- MDSNSQ sequences
- MDSNTB table, index, or view privileges
- MDSNTS tablespace privileges
- MDSNUF user-defined function privileges
- MDSNUT user-defined distinct type privileges

These are the classes that are used in the RACF commands such as:

```
RDEF MDSNTB 'DB1G.DSN8810.EMP.SELECT' UACC(NONE)
PE 'DB1G.DSN8810.EMP.SELECT' CLASS(MDSNTB) ID(USER1) ACC(READ)
```

IBM also supplies “group” classes

- GDSNTB for example
- One for each member class
- Allows individual profiles to be grouped together under one group profile:

```
RDEF GDSNTB DSN8810_TABGROUP UACC(NONE) +
ADDMEM (DB8L.DSN8810.ACT.SELECT, +
DB8L.DSN8810.DEPT.SELECT)
RALT GDSNTB DSN8810_TABGROUP ADDMEM(DB8L.DSN8810.PROJ.SELECT)
PERMIT DSN8810_TABGROUP CLASS(GDSNTB) ID(USRT051) ACC(READ)
SETROPTS RACLIST(MDSNTB) REFRESH
```

Before a resource class can be used it must be activated using the following commands:

```
SETROPTS CLASSACT(DSNADM) GENERIC(DSNADM)
SETROPTS CLASSACT(MDSNTB) GENERIC(MDSNTB)
```

Notes:

- DB2 will only use RACF security for the classes that are activated
- DB2 must be restarted if resource classes are activated or deactivated
- Not necessary to activate all resource classes – DB2 security will be used

How it Works

When a resource class is active then RACF security is checked every time a security request is made for that class. If there is no RACF profile set up to protect the DB2 resource then security checking is passed to DB2. Note that DB2 security is not actually deactivated when RACF security is used.

If RACF prevents access then a traditional RACF message will be written to the log:

```
ICH408I USER(USRT060 ) GROUP(SYS1 ) NAME(MLS TEST USER )
DB8L.DSN8810.EMP.SELECT CL(MDSNTB )
INSUFFICIENT ACCESS AUTHORITY
FROM ** (G)
ACCESS INTENT(READ ) ACCESS ALLOWED(NONE )
```

To prevent access checking going through to DB2 if a profile is not specified in RACF, always define a “top” generic profile to protect each class:

```
RDEF MDSNTB ** UACC(NONE)
RDEF DSNADM ** UACC(NONE)
```

RACF security is never called for INSTALL SYSADM or INSTALL SYSOPR as they are defined in ZPARMS.

In certain instances the RACF authorization checking done by RACF is different from that done by DB2:

- Granting authorities WITH GRANT option is not supported.
- If you want DB2 to drop the view when a privilege is revoked you must use the SQL statements GRANT and REVOKE.
- A full list of differences can be found in the DB2 V8 RACF Access Control Module Guide.

Defining RACF resources

Here are recommendations for defining RACF resources:

- Protect multiple DB2 objects with a single security rule using a combination of RACF generic, grouping, and member profiles.
- Examine the current RACF environment, including the user group structure, resource naming conventions, and use of grouping classes.
- Examine the DB2 objects looking for naming conventions and other similarities in resource names that you can exploit with generic RACF profiles.
- Examine the GRANT authorizations in place for DB2 objects to see which RACF user groups you can define or exploit to reduce the RACF authorizations you must create using the RACF PERMIT command.
- Integrate new DB2 users into the existing RACF user structure and delegate RACF group and class authorities.
- Consider using the WARNING option of RDEFINE and RALTER commands. You will see ICH408I messages identifying profiles that would fail a request.
- Run the IBM supplied CLIST to extract security details from DB2 Catalog and generate corresponding RACF resource profiles.

This CLIST can be found at <http://www.ibm.com/servers/eserver/zseries/zos/racf/>

Select "Downloads" from menu on left of page

Download RACFDB2

Migrating to RACF Considerations

Here are some things you should consider if you decide to migrate your DB2 security to RACF:

- RACF administrators will need to be educated on DB2 security requirements
- DB2 DBA's and RACF administrators should work together to decide how RACF resources for DB2 should be defined
- New formal procedures will need to be put in place to action DB2 security requests
- You don't need to migrate protection of all DB2 objects at once
- Don't start with the production environment!
- Plan! Plan! Plan!



DFSMS Data Collection Facility – DCOLLECT



本期专家: John Varendorff

资深主机系统专家，拥有二十年以上的主机经验。

自 2005 年起加盟百硕公司，作为外籍常驻主机专家，参与了中国人民银行、中国建设银行软件开发中心等多项主机咨询和实施服务项目，拥有丰富的本地服务经验，非常了解国内主机用户的实际需求。

Introduction

The DFSMS Data Collection Facility provides the ability to generate Records that detail the Existing Configuration and Usage of your Storage Management environment on the IBM z/OS Operating System.

This facility is invoked by running the AMS (Access Method Services) DCOLLECT Command. The DCOLLECT Command can be either be run interactively from ISPF using ISMF (Interactive Storage Management Facility) or in Batch using the IDCAMS Program.

DCOLLECT is the tool provided by IBM with z/OS to provide Storage Management information for later Programmatic Analysis. DCOLLECT Records can be analyzed to measure the usage of your Disk and Tape Storage and the effectiveness of your Storage Management efforts.

It is also worthwhile to retain DCOLLECT Information on a regular basis. Capacity Planning Reports and Graphs for your Disk and Tape Storage Resources can be produced based upon this Retained DCOLLECT Data. Later in this article we will describe some of the approaches to achieve this.

DCOLLECT produces Records detailing the following:

Active Datasets
VSAM Dataset Information
Disk Volumes
Inactive Datasets

Capacity Planning

**SMS (System Managed Storage)
Configuration Information**

Space Usage and Data Set Attributes
VSAM Specific Data Set Information
Statistics and other Information for All or Selected Volumes
Space Usage and Data Set Attributes for Migrated Data Sets and Dataset Backups managed by DFSMSHsm (Hierarchical Storage Manager).
Statistics and other Information about the Disk and Tape Volumes managed by DFSMSHsm

Information either from the 'Active' SMS Configuration or an Inactive SMS Configuration stored in an SCDS (Source Control Dataset).

SMS Attributes for the following are provided:

- Data Class Constructs
- Storage Class Constructs
- Management Class Constructs
- Storage Group Constructs
- SMS Volume Information
- SMS Base Configuration Information
- Aggregate Group Construct Information
- Optical Drive Information
- Optical Library Information
- Cache Names

- Accounting Information about the SMS ACS (Automatic Class Selection) Routines

Invoking DCOLLECT from ISMF

DCOLLECT can be run from the ISMF Primary Option Menu using Option C (Data Collection) as shown below:

```

Panel  Help
-----
                ISMF PRIMARY OPTION MENU - z/OS DFSMS V1 R7
Enter Selection or Command ==> C

Select one of the following options and press Enter:
0  ISMF Profile           - Specify ISMF User Profile
1  Data Set               - Perform Functions Against Data Sets
2  Volume                 - Perform Functions Against Volumes
3  Management Class      - Specify Data Set Backup and Migration Criteria
4  Data Class             - Specify Data Set Allocation Parameters
5  Storage Class         - Specify Data Set Performance and Availability
6  Storage Group         - Specify Volume Names and Free Space Thresholds
7  Automatic Class Selection - Specify ACS Routines and Test Criteria
8  Control Data Set      - Specify System Names and Default Criteria
9  Aggregate Group       - Specify Data Set Recovery Parameters
10 Library Management    - Specify Library and Drive Configurations
11 Enhanced ACS Management - Perform Enhanced Test/Configuration Management
C  Data Collection      - Process Data Collection Function
L  List                  - Perform Functions Against Saved ISMF Lists
P  Copy Pool             - Specify Pool Storage Groups for Copies
R  Removable Media Manager - Perform Functions Against Removable Media
X  Exit                  - Terminate ISMF

Use HELP Command for Help; Use END Command or X to Exit.
    
```

The ISMF Data Collection Entry Panel will be displayed. This is a scrollable panel giving access to a number of fields where DCOLLECT Parameters are specified.

There is Field Sensitive Help available for each parameter by moving to a field and pressing the PF1 Key.

```

Panel  Utilities  Scroll  Help
-----
                DATA COLLECTION ENTRY PANEL                Page 1 of 3
Command ==>

Select Data Collection options:
Data Set Information . . . Y          (Y or N; Y requires volume(s) or
Volume Information . . . . Y          storage group(s) on next page)
Migration Data . . . . . N           (Y or N)
Backup Data . . . . . N              (Y or N)
Capacity Planning Data . . N         (Y or N)
SMS Data . . . . . N                 (Y or N)
Specify Output Data Set:              (1 to 44 Characters)
Data Set Name . . . . .              (Ignored if SMS-managed data set)
Optional Password . . . . .          (Y or N)
Replace Contents . . . . . N         (Y or N)
Number of Data Sets . . . . 1        (1 to 99999999; new data set only)
Specify Input Data Set:              (1 to 44 Characters)
Migration Data Set Name . .
Backup Data Set Name . . .
CDS Name . . . . . 'ACTIVE'
    
```

Use ENTER to Perform Selection; Use DOWN Command to View next Entry Panel;
Use HELP Command for Help; Use END Command to Exit.

Further information about invoking DCOLLECT from ISMF can be obtained from the IBM z/OS DFSMSdfp Storage Administration Reference (Document Number SC26-7402).

DCOLLECT Batch JCL

The following is Sample JCL to run the AMS (Access Methods Services) DCOLLECT Command in a Batch Environment:

```
//DCOLLECT JOB ,CLASS=A,MSGCLASS=X,NOTIFY=&SYSUID,REGION=0M
//*
//AMS      EXEC PGM=IDCAMS
//*
//SYSPRINT DD  SYSOUT=*
//DCOUT    DD  DSN=dcollect_records_dataset,
//          DISP=(NEW,CATLG,DELETE),
//          SPACE=(space_units,(space_primary,space_secondary)),
//          DSORG=PS,RECFM=VB,LRECL=32756
//MCDS     DD  DSN=dfsmshsm_bcds_dataset,DISP=SHR
//BCDS     DD  DSN=dfsmshsm_mcds_dataset,DISP=SHR
//SYSIN    DD  *
          DCOLLECT -
              OUTFILE(DCOUT) -
              VOLUMES( -
                  * -
                  ) -
              MIGRATEDATA -
              BACKUPDATA -
              CAPPLANDATA -
              SMSDATA(ACTIVE) -
/*
```

The dataset allocated to the DCOUT DD Statement will contain the DCOLLECT Records produced.

If either the BACKUPDATA or CAPPLANDATA Parameter is specified, then the BCDS DD Statement is required.

Similarly, if either the MIGRATEDATA or CAPPLANDATA Parameter is specified then the MCDS DD Statement is also required.

When the DCOLLECT Command is run in Batch, you should expect Output as shown below to be written to the SYSPRINT DD Statement allocated to SYSOUT:

```
IDCAMS  SYSTEM SERVICES                                TIME: hh:mm:ss

          DCOLLECT -
              OUTFILE(DCOUT) -
              VOLUMES( -
                  * -
                  ) -
              MIGRATEDATA -
              BACKUPDATA -
              CAPPLANDATA -
              SMSDATA(ACTIVE)

IDC11818I CACHE SET NAME INFORMATION NOT FOUND
IDC11818I AGGREGATE GROUP CONSTRUCT INFORMATION NOT FOUND
IDC11818I OPTICAL DRIVE INFORMATION NOT FOUND
IDC01811I NUMBER OF 'D ' RECORDS PROCESSED WAS 49115
IDC01811I NUMBER OF 'A ' RECORDS PROCESSED WAS 10616
```

```

IDC01811I NUMBER OF 'V ' RECORDS PROCESSED WAS 767
IDC01811I NUMBER OF 'T ' RECORDS PROCESSED WAS 3
IDC01811I NUMBER OF 'DC' RECORDS PROCESSED WAS 9
IDC01811I NUMBER OF 'SC' RECORDS PROCESSED WAS 5
IDC01811I NUMBER OF 'MC' RECORDS PROCESSED WAS 12
IDC01811I NUMBER OF 'SG' RECORDS PROCESSED WAS 91
IDC01811I NUMBER OF 'VL' RECORDS PROCESSED WAS 3486
IDC01811I NUMBER OF 'BC' RECORDS PROCESSED WAS 1
IDC01811I NUMBER OF 'LB' RECORDS PROCESSED WAS 1
IDC01811I NUMBER OF 'AI' RECORDS PROCESSED WAS 1
IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0
IDCAMS  SYSTEM SERVICES                TIME: hh:mm:ss

IDC0002I IDCAMS PROCESSING COMPLETE. MAXIMUM CONDITION CODE WAS 0
    
```

Further information about running the DCOLLECT Command in a Batch Environment can be obtained from IBM z/OS DFSMS Access Method Services for Catalogs (Document Number SC26-7394).

DCOLLECT Command Parameters

The following are the Parameters that are usually specified on the DCOLLECT Command with a brief description of the use of each parameter:

Parameter	Description	Required or Optional
OUTDATASET (dataset)	DCOLLECT Records produced will be written to this Dataset. Must be RECFM=VB and no larger than LRECL=32756. Either OUTDATASET or OUTFILE must be specified.	REQUIRED
OUTFILE (ddname)	Specifies the DD Statement to write the DCOLLECT Records to. Should allocate a Dataset with the same RECFM and LRECL as described for OUTDATASET. Either OUTDATASET or OUTFILE must be specified.	REQUIRED
BACKUPDATA	DCOLLECT Type 'B' Records will be produced for Dataset Backup information from the DFSMSHsm BCDS (Backup Control Dataset). BCDS DD Statement must be allocated to the DFSMSHsm BCDS.	OPTIONAL
CAPPLANDATA	DCOLLECT Type 'C' DASD Capacity Planning Records and Type 'T' Tape Capacity Planning Records will be produced. Both the BCDS and MCDS DD Statements must be allocated to the DFSMSHsm BCDS and MCDS.	OPTIONAL

Parameter	Description	Required or Optional
EXCLUDEVOLUMES (volser, volser,)	Exclude information for Fully or Partially Specified Volume Serial Numbers. Can include 1 to 6 Character Volume Serial Numbers or Partially Specified Volume Serial Numbers followed by Single Asterisk: VOL*	OPTIONAL
MIGRATEDATA	DCOLLECT Type 'M' Records will be produced for Migrated Dataset information from the DFSMSHsm MCDS (Migration Control Dataset). MCDS DD Statement must be allocated to the DFSMSHsm MCDS.	OPTIONAL
NODATAINFO	Prevent the generation of DCOLLECT Type 'A' and Type 'D' Dataset Information Records. Used if only Volume Type Records need to be produced by DCOLLECT.	OPTIONAL
NOVOLUMEINFO	Prevent the generation of DCOLLECT Type 'V' Volume Information Records. Used if only Dataset Type Records need to be produced by DCOLLECT.	OPTIONAL
REPLACE or APPEND	Applies only if the OUTDATASET Parameter is used. DCOLLECT Data in OUTDATASET is either Replaced or Added to based on this Parameter.	OPTIONAL
SMSDATA(ACTIVE) or SMSDATA(SCDSNAME (scds_dsn)	DCOLLECT SMS Configuration Data Records of the following Types are produced: <ul style="list-style-type: none"> • Type 'DC' • Type 'SC' • Type 'MC' • Type 'BC' • Type 'SG' • Type 'VL' • Type 'AG' • Type 'DR' • Type 'LB' • Type 'CN' • Type 'AI' 	OPTIONAL
STORAGEGROUP (storgrp, storgrp,)	All Online Volumes in these Storage Groups will have DCOLLECT Records produced. Dataset Information for each Dataset is produced unless NODATAINFO is specified. Volume Information for each Volume is produced unless NOVOLUMEINFO is specified.	OPTIONAL

Parameter	Description	Required or Optional
VOLUMES (volser, volser,)	<p>Include information for Fully or Partially Specified Volume Serial Numbers.</p> <p>Can include 1 to 6 Character Volume Serial Numbers or Partially Specified Volume Serial Numbers followed by Single Asterisk:</p> <p style="text-align: center;">VOL*</p> <p>Specifying '*****' indicates Information for the SYSRES (System Residence) Volume will be produced.</p>	OPTIONAL

Further information about all DCOLLECT Command Parameters can be obtained from IBM z/OS DFSMS Access Method Services for Catalogs (Document Number SC26-7394).

DCOLLECT Record Types

The following is a List of all DCOLLECT Record Types and a brief description for each Type:

Record Type	Description
Type 'D'	Active Dataset Record. One Type 'D' Record generated for every Physical Dataset on every Volume that is selected for DCOLLECT Processing.
Type 'A'	VSAM Association Record. One Type 'A' Record generated for each VSAM Dataset Associated Component on the Volumes selected by DCOLLECT. Information about the Base Cluster Catalog Entry is included.
Type 'V'	Volume Information Record One Type 'V' Record generated for each Online Volume selected for DCOLLECT Processing. Records for Both SMS and Non-SMS Managed Volumes are generated. Volumes Selected are determined by the VOLUMES and EXCLUDEVOLUMES Parameters.
Type 'M'	Migrated Dataset Record. One Type 'M' Record generated for each DFSMSHsm Migrated Dataset.
Type 'B'	Dataset Backup Record. One Type 'B' Record generated for each DFSMSHsm Dataset Backup.
Type 'C'	DASD Capacity Planning Record. Multiple Type 'C' Records generated for each DASD Volume Managed by DFSMSHsm that is defined as a Migration Volume. This includes the following: <ul style="list-style-type: none"> SMS Managed Primary Volumes in Storage Groups defined with AUTO MIGRATE Non-SMS Managed Primary Volumes defined to DFSMSHsm with ADDVOL AUTOMIGRATION DFSMSHsm Migration Level 1 Volumes <p>The number of records for produced for each volume is set by the DFSMSHsm SETSYS MIGRATIONCLEANUPDAYS 'statdays' Value. This value controls the number of days that DFSMSHsm keeps Daily and Volume Statistics Records. These records are used for DCOLLECT DASD Capacity Information.</p>
Type 'T'	TAPE Capacity Planning Record. One Type 'T' Record generated for each different category of Tape Volume Managed by DFSMSHsm. These categories are as follows: <ul style="list-style-type: none"> Backup Dump Migration <p>For each category, the Type 'T' Record includes the number of Full, Partially Full and Empty Tape Volumes.</p>
Type 'DC'	SMS Data Class Record. One Type 'DC' Record generated for each defined SMS Data Class.

Record Type	Description
Type 'SC'	SMS Storage Class Record. One Type 'SC' Record generated for each defined SMS Storage Class.
Type 'MC'	SMS Management Class Record. One Type 'MC' Record generated for each defined SMS Management Class.
Type 'SG'	SMS Storage Group Record. One Type 'SG' Record generated for each defined SMS Storage Group.
Type 'VL'	SMS Managed Volume Record. One Type 'VL' Record generated for each defined SMS Managed Volume.
Type 'BC'	SMS Base Configuration Record. One Type 'BC' Record only generated.
Type 'AG'	SMS Aggregate Group Record. One Type 'AG' Record generated for each defined SMS Aggregate Group. Aggregate Groups define the Datasets and Other Resources to be Backed-Up by the ABARS (Aggregate Backup and Restore System) Component of DFSMSshm. This component is used for Disaster Recovery purposes.
Type 'DR'	SMS Optical Drive Record. One Type 'DR' Record generated for each defined SMS Optical Drive.
Type 'LB'	SMS Optical and Tape Library Record. One Type 'LB' Record generated for each defined SMS Optical or Tape Library.
Type 'CN'	SMS Cache Record. One Type 'CN' Record generated for each defined CF (Coupling Facility) Cache Structure.
Type 'AI'	SMS Accounting Information Record. One Type 'AI' Record only generated. Contains information of the Current Source Datasets and Members of all of the SMS ACS (Automatic Class Selection) Routines.

DCOLLECT Record Structures

The Record Structures for all DCOLLECT Record Types are documented in Appendix F Section F.1 DCOLLECT Output Record Structure of the following IBM Document:

z/OS DFSMS Access Method Services for Catalogs (Document Number SC26-7394)

There are also Assembler DSECT (Data Section) Macros provided by IBM to Map the DCOLLECT Record Structures when read by Assembler Language Programs.

The following details the DCOLLECT Record Types and the Supplied DESCT Macro that describes it:

Record Types	Assembler DSECT Macro
Type 'D', 'A', 'V', 'DC', 'SC', 'MC', 'BC', 'SG', 'VL', 'AG', 'DR', 'LB', 'CN' and 'AI'	Dataset SYS1.MACLIB Member IDCDOU
Type 'M', 'B', 'C' and 'T'	Dataset SYS1.MACLIB Member ARCUTILP Note: When using the ARCUTILP DSECT Macro, specifying the IDCDOU=YES Parameter will also Map fields from IDCDOU.

DCOLLECT Reporting Tools

There are a number of Tools available to Read and Report DCOLLECT Record Data. The following is a list of some of these Tools:

Tool	Description	Internet URL
DFSORT (ICETOOL)	<p>Most z/OS Systems have the DFSORT Product installed for Rapid Data Sorting and Analysis.</p> <p>This product includes a Tool known as ICETOOL to Format Data for Reporting. IBM supply DFSORT Synonyms for DCOLLECT Records which describe the Record Structures. These can be downloaded from the URL provided.</p> <p>ICETOOL can use these Synonyms to then read, manipulate and report on DCOLLECT Data.</p> <p>The DFSORT DCOLLECT Samples provided by IBM also include some Sample JCL to produce the DFSORT ICETOOL Reports.</p>	<p>http://www-304.ibm.com/jct01004c/systems/support/storage/software/sort/mvs/srtmdwn.html#ex</p>
DCOLREXX	<p>On every z/OS System, IBM provides numerous Code Samples in the SYS1.SAMPLIB Dataset.</p> <p>One of the members in SYS1.SAMPLIB is ARCTOOLS.</p> <p>The ARCTOOLS Member includes many Sample Tools related to DFSMSHsm.</p> <p>One of these Tools is DCOLREXX. This is a Sample Rexx Program to Read and Create Simple Reports from DCOLLECT Data.</p>	
CBT Tape	<p>One of the most widely used Sites for free z/OS Tools is the CBT Tape Site. The available Tools are documented in CBT File001.</p> <p>By searching in this File for the string 'DCOLLECT', many Tools can be found for Reporting on some aspect of DCOLLECT Information.</p>	<p>http://www.cbttape.org/cbtdownloads.htm</p>

Bayshore DCOLLECT Reporter

Bayshore can also provide a Tool to Create, Format and Report on DCOLLECT Data using the Relational Database capabilities of the MS/Access Database on a MS/Windows Workstation.

This Tool does the following:

- Dynamically determines the DCOLLECT Record Structures from the IBM Supplied DSECT Assembler Macros.
- Reformats DCOLLECT Records into CSV (Comma Separated Values) Format based on these DCOLLECT Record Structures.
- Manages the Transfer and Import of these DCOLLECT CSV Files to a MS/Windows Workstation.
- Imports these CSV Files into a Supplied MS/Access Database using Table and Field Names the same as the Original DCOLLECT Records.
- Manipulates the DCOLLECT Data using MS/Access Relational Queries.
- Produces Supplied and User Developed Reports of the DCOLLECT Data.

All of these functions are managed from a Windows Workstation. Therefore there is no requirement to Logon to TSO on the z/OS System to Collect and Report on your DCOLLECT Data.

DASD Analysis Methodology



By Thomas Beretvas
December / January, 2005 | 《z/Journal》

Professional Abstract

引言:

这是 z/Journal 刊登的一篇文章。作者 Thomas Beretvas 曾在 IBM 服务 28 年，非常精通主机性能分析领域。作为主机资深顾问之一，Thomas Beretvas 应我公司邀请于 2006 年底曾来中国，在北京与上海两地举办了 EPS 课程的高级培训。在这次培训中，Thomas 先生主要介绍了“*The value of Good DASD response time*”和“*DASD Tuning*”两个专题。z/Journal 上的这篇文章中有关磁盘性能分析的思路与培训专题“*DASD Tuning*”是完全一致的，主要内容包括：磁盘调整方法；磁盘使用分析的工具介绍；如何选择对 I/O 性能影响大的 DASD 进行分析等等。

本文非常适合作为 EPS 培训专题“*DASD Tuning*”的对照参考，也可单独作为主机磁盘性能分析的材料供学习与借鉴。

- EPS (Enterprise Performance Strategies, Inc.) 公司是百硕同兴的合作伙伴
百硕资深工程师 罗文军

My article in the June/July z/JOURNAL “*The Value of Good DASD Response Time*” discussed DASD Response Time (RT) in the z/OS environment, identified its components, and illustrated the value of good RT. If RT isn't good, then tuning or other remedial actions (such as a DASD hardware upgrade) is required. This article briefly recaps key points from the prior article, discusses how to identify symptoms of DASD tuning problems.

The basic DASD RT equation has four primary components: IOSQ, DISC, CONN, and PEND times. For example, $RT = IOSQ + DISC + CONN + PEND$. Figure 1 illustrates DASD RT guidelines.

The Need for a DASD Tuning Methodology

DASD tuning becomes necessary when DASD performance is inadequate.

RT Component	ESCON	FICON
IOSQ	< 0.5 ms	< 0.5 ms
PEND	< 0.5 ms	< 0.5 ms
DISC	< 0.5 ms	< 0.5 ms
CONN	~ 2.0 ms	~ 1.0 ms
Approximate Average RT	< 3.0 ms	< 2.0 ms

Figure 1: DASD Response Time Guidelines

Figure 2 indicates that if the RT for a particular logical volume (or overall) exceeds a recommended value, tuning analysis is needed. Since an installation typically has thousands of logical volumes, examining all of them is piratical. Instead, have a methodology that can easily and quickly identify the “heavy hitter” volumes. The analysis can be further narrowed to those “interesting” volumes associated with key applications such as CICS.

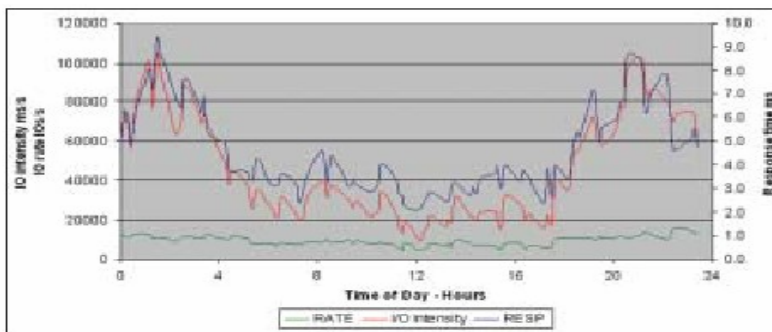


Figure 2: I/O Measurement Value Variation Over the Day

DASD Tuning Methods

Some well-known approaches to improve DASD performance include:

Using Data in Memory (DIM) techniques by maintaining data in processor storage. Using VSAM buffers is an example.

Acquiring additional hardware such as newer DASD, more or faster channels, more or faster control units, more cache, and the use of Parallel Access Volumes (PAVs).

Moving data sets from poor performing or heavily used volumes or control units to relatively unused locations.

Adjusting applications to use large block sizes or fewer I/O invocations.

Before taking actions, it's important to determine whether or not a problem exists. If it does exist, then identify the problem areas, such as the primary set of logical volumes, which are causing the greatest impact to the DASD I/O environment.

Analysis Methodology

You can use a highly successful DASD analysis methodology to rapidly identify DASD I/O performance problem. The methodology discussed here will help pinpoint problems associated with logical volumes and others that are related to Logical Control Units (LCUs) or are system-wide. The methodology presented here uses the IBM Resource Measurement Facility (RMF) Spreadsheet Reporter (SSR), which is available free on the Web, but other data-reduction tools, such as SAS, MXG, and MICS, can easily replicate the approach used. The essence of the approach is to take the performance reports (SMF, RMF, or CMF reports) and extract from the mass of available data that portion of the data (the interesting logical volumes) that focuses on bad I/O performance.

The SSR's approach is to convert the RMF reports into spreadsheets and, by judicious use of Microsoft Excel macros and other facilities, highlight the problem situation. Start by examining the overall system, and then focus on individual logical volumes that may further lead to examining individual storage processors. The methodology requires introducing some new concepts such as I/O and queuing intensities and filtering.

Selection Which Logical Volumes to Analyze

Most installations have hundreds or thousands of logical volumes. Usually, only a small set of these volumes are worthy of detailed analysis. The question becomes how to narrow down the number to just a few that have the largest impact.

The first step is to collect a set of measurements necessary for a DASD I/O analysis. The best measurements are those that represent average values, not instantaneous snapshot values. Because installation workloads tend to be repetitive, this methodology yields great insight into DASD I/O performance, since it focuses on a few representative sets of data. Bad RTs occurring at 2 p.m. yesterday are likely to occur at the same time today and tomorrow, so we can identify remedial actions with somewhat general applicability.

I/O and Queuing Intensities

The next step is to identify the individual logical volumes with problems that have significant impact on overall system performance. It isn't enough to select logical volumes for analysis by using solely the TR criterion reviewed in Figure 1 ($RT > 2$ ms or $RT > 3$ ms). That's because a logical volume with large RT and low I/O rate could have little or no impact on overall system or workload performance. Here, we can introduce two concepts to help in this area: I/O Intensity (I/OInt) and Queuing Intensity (QInt). Both facilitate more effective analysis. If we use S to represent the I/O rate in terms of I/O events per second, and RT to represent I/O RT, then the following can be derived:

- I/O Intensity: $I/OInt = S \times RT$
- Queuing Intensity: $QInt = S \times (DISC + IOSQ + PEND) = S \times (RT - CONN)$.

I/OInt is the product of I/O rate, S, to a logical volume and the corresponding logical volume RT. The QInt formula is similar to the I/OInt formula, but excludes the connect time component, CONN, from the RT. This is because connect time is the productive component of RT, associated with transfer, while the other three (DISC, IOSQ, and PEND) all represent queuing delays.

Using a high I/OInt value is often adequate to highlight heavy-hitter logical volumes. The dimension of this entity, milliseconds per second or ms/sec, may initially look odd, but it's the result of the dimensions used for S and RT.

Why I/O and Queuing Intensity?

The intensity values are a function of both the I/O activity rate to a logical volume and the volume's RT. The point is to eliminate uninteresting volumes. If just RT is used to identify "interesting" logical volumes, but there are only a few I/Os to that logical volume, then fixing the high I/O RTs may result in little overall improvement. By examining logical volume RT with many I/Os against the logical volume, the analyst can quickly zero in on the high-impact volumes.

If a logical volume has high CONN time often due to sequential chained I/O events, selection based only on high I/O intensity may identify a volume with low delays as an interesting one. Introducing QInt avoids this. You can use a QInt criterion of 100 ms/sec to identify an initial set of "interesting" logical volumes.

Using these intensities lets you focus on a handful of logical volumes instead of thousands. For an initial analysis, it's acceptable to choose the 10 to 20 logical volumes with the largest QInt.

Need for Filtering

After determining the RT, S, and intensity values for each logical volume (I/OInt and QInt) of interest, you need to select the set of volumes worthy of focus.

Using the intensity measures simplifies the selection process. Volumes with high intensities are assumed to be those that are having the most impact on DASD I/O subsystem performance. However, some additional refinement is necessary.

As a further selection criterion, limit the volumes of interest to those passing these specifications:

- RT should exceed some threshold value. I suggest selecting only those logical volumes with response time greater than 3 ms. Why this criterion? Say we have a logical volume whose I/O activity rate is 200 IO/sec and its RT is only 2 ms. Then the calculated I/OInt is 400 ms/sec. When compared against the I/OInt of other logical volumes, this value may seem high, but this logical volume also has an RT within guidelines, so this logical volume is "uninteresting" for further analysis.
- The I/O rate, S, should exceed 1 IO/sec. Why this criterion? Say we have a logical volume with a horrible RT of 2,000 ms, but an I/O activity rate of only 1 IO/sec. In this case, I/OInt is 200 ms/sec. Again, this might seem high, but in most situations, volumes with a low I/O rate don't represent problems and are often just statistical anomalies.

You can apply these filters to exclude some uninteresting logical volumes.

When analyzing an ESCON environment, you can use the following filters to help zero in on those logical volumes of most interest. Exclude all local volumes with:

- QInt less than 100 ms/sec
- RT less than 3 ms
- Total queue time (DISC + IOSQ + PEND) less than 1 ms (omits volumes where RT is high due to high CONN time only)
- I/O rate, S, less than 1 IO/sec.

At this point in your logical volume analysis, you've completed these steps:

- Collected a set of representative measurements, including each logical volume's RT and I/O activity rate, S
- Calculated I/OInt and QInt for the volumes
- Determined the 10 to 20 logical volumes with the highest QInt
- Applied filters to select the most interesting volumes.

Once interesting DASD volumes have been identified, you can focus on the "dominant" RT component for each volume. This is where you apply the RT component criteria in Figure 2. If a component such as IOSQ, DISC, or PEND is identified, then further analysis and corrective action become easier.

Examples of Logical Volume Analysis

The following is a list of sample RT breakdowns from a typical logical volume RT analysis. In each of the following examples, if the dominant RT component can be clearly identified, then further analysis is easier.

- RT = 37 ms, IOSQ = 32 ms, DISC = 2 ms, PEND = 1 ms, CONN = 2 ms. Here the problem is reduction of IOSQ.
- RT = 15 ms, IOSQ = 4 ms, DISC = 8 ms, PEND = 1 ms, CONN = 2 ms. Here the problem is reduction of DISC.
- RT = 16 ms, IOSQ = 4 ms, DISC = 2 ms, PEND = 8 ms, CONN = 2 ms. Here the problem is reduction of PEND.

Sometimes, the dominant component isn't so clear, as in these examples:

- RT = 26 ms, IOSQ = 12 ms, DISC = 1 ms, PEND = 1 ms, CONN = 2 ms. Here, the most likely cause of the problem is high DISC time, which causes high logical volume utilization, resulting in high IOSQ time.
- RT = 34 ms, IOSQ = 12 ms, DISC = 11 ms, PEND = 1 ms, CONN = 10 ms. Here, the problem is probably caused by the high CONN time. Reducing CONN time would most likely reduce the other components. Reducing IOSQ or DISC would be partially helpful.

Summary

This article examined a DASD analysis methodology that could be used to identify interesting DASD volumes by using I/O and queuing intensity values calculated for each logical volume, and then applying some simple filtering criteria. To facilitate the analysis, the freely available RMF SSR was used.

Five Days in August at SHARE

百硕外籍技术专家 Martha Hall



SHARE is a wonderful event put on by IBM and the IBM US Users Group. This meeting was held in San Diego California. This was my first trip to San Diego and it is truly one of the most beautiful cities in the USA.

At SHARE, we can keep up with the latest technology, determine the latest IT trends and see friends as well.

This blog will give you an idea of what goes on every day. There are approximately 100 sessions every day. You chose which sessions you want to attend. Sessions are 45 minutes each and you can attend 6 sessions a day. Networking goes on all day and at night too since an open bar with free beer and snacks is offered every night.

I saw many old friends from the Washington Systems Center and spent much of my free time socializing with them.

So, let's get going.....

Monday August 13th

Monday is Project opening day. I am interested in the z/OS project, the Performance and

Capacity planning Project and the CICS and MQ project.

z/OS Project

z/OS V1.9 is the big topic. Everyone is very interested to find out how SMF will use the system logger to write SMF data. We can finally get rid of the SMF data sets. Although we knew this was coming, it is still big news. In z/OS V1.9 you can still use the MAN datasets, but most people are anxious to find out how to use the system logger implementation and begin planning. A session for this is announced to be held on Wednesday.

Also announced for z/OS V1.9 is Server Time Protocol which will replace the SYSPLEX Timers and ETR. Sessions for STP are announced for Wednesday.

There is a great deal of interest in the zIIP specialty engines. Not only do they support some DB2 DDF functions and utilities, now they will allow IP/Sec to take advantage of the zIIP engines.

There is a big performance issue with the OSA Express 2 on z890 and z990 and z9 Processors and the large send support. The segmentation offload support should be disabled in order to avoid what IBM calls extremely poor throughput. The performance

issues are documented in APAR PK12893. This function can be turned off in the TCP/IP profile global configuration section. APAR PK46334 (HIPER) turns the function from enabled (ON) to disabled (OFF). You can see Washington System Center flash 10458.

Documentation is provided for the z/OS migration checker, IBM health checker, the enhanced PSP tool, and new Stand-Alone dump recommendations.

Performance and Capacity Planning Project

APAR OA18452 is available. This APAR addresses a low capture ratio caused by SRM timing routines running too frequently. It changes the values in parmib member IEAOPTnn RMPTTOM. This is documented in WSC Flash 10526.

There is also a WSC Flash which documents several previously undocumented keywords in IEAOPTnn. These keywords are important for installations with large amounts of real storage so this would apply to most installations in China. This is documented in WSC Flash 10598.

Also announced is a new version of zPCR.

There was also a discussion about how lightly used partitions in a Parallel SYSPLEX with a low weight can impact productions systems. I believe this also applies to systems in China. The session also discussed how to optimize logical CP assignments on a z990 due to a multi-book implementation.

Sessions on these topics will be held during the week.

Introduction to IBM CRYPTO functions

I walked into this session and found my good friend Greg Boyd is now a Washington Systems Center specialist on CRYPTO. Greg and I worked together in IBM Professional Services and the Washington Systems Center. He provided an excellent session on how to use all kinds of IBM Crypto implementations.

Monday's over and I am really tired. So much good information.

On to Tuesday....

Tuesday August 14th

A big day for CICS and TCP/IP. I started out the day with a session on TCP/IP Trouble shooting Tips and Tools. This was very valuable and I learned a lot about recommendations for TCP/IP. Then I was off to

another session for TCP/IP Performance Management for Dummies.

In the afternoon I spent time at the CICS Sessions. Many of the CICS sessions this time were dealing with making applications threadsafe. For many years people have been dealing with CICS and the problems that have come about because of the CICS applications running on a single QR TCB. Making applications threadsafe means that the applications can run on many L8 or L9 TCBs. This means CICS applications can do a lot more work and also reduce the CPU requirements at the same time.

These sessions provide a great deal of information on the threadsafe conversion techniques for CICS Applications as well as the Implications of Threadsafes on CICS applications. We learned about how GE converted to Threadsafes applications to minimize TCB switching. The initial threadsafe conversion yielded 12% savings and the second phase yielded an additional 20% for a total 36% reduction in CPU. This is impressive.

It seems that many large data processing centers have started if not completed their conversions. I would like to see this project get started in China.

Two other CICS Presentations were very useful. One of them discussed CICS Performance Management Best Practices and the other discussed how to use CICS Statistics to collect Performance Information.

Wednesday August 15th

HAPPY BIRTHDAY to me!!

I have lots of sessions to attend today. I start out this morning attending two sessions on an overview and planning techniques on how to use the Server Time Protocol (STP) to replace the old SYSPLEX Timers. The subject is very interesting, but there is significant amount of planning required.

Next, I attend a good session on how to use the IBM Web Sphere HATS product to transform CICS green screen or 3270 applications to the WEB. This product can provide quick and easy transformation of old application into HTML interfaces. The HATS product is rules based and highly customizable for individual applications. Sounds like a quick way to get into WEB based applications.

Wednesday afternoon I attend a great session on WebSphere MQ and CICS. The session discusses tips and Best Practices for High Availability for WebSphere MQ. We discussed WMQ clusters, Shared Queues, Queue Sharing Groups, and the WMQ Restart and Recovery Performance.

The next session discussed WebSphere Performance on z/OS and WebSphere MQ Triggering.

Then out to dinner with an old friend from the Washington Systems Center and her husband. I worked with Jenny and CK Liang at GE in the 1980s and then again with Jenny at the Washington Systems Center. Jenny, CK, Yuping, Mike and I had a great birthday dinner outside overlooking the San Diego Bay. It was wonderful.

Thursday, August 16th

Back to the sessions. Every session I attend, I see people I have worked with before. It's great to chat with them and find out what they are doing now!!

I start by attending a three part session on how to migrate to z/OS V1.9. We discuss all the new things that are coming out in this version. There is a supported migration path to z/OS V1.9 from V1.7 and V1.8.

We also talk about the migration tool which is available to help determine what tasks and reports on which migration actions need to be done for the migration. This is an IBM downloadable tool. There is a technical paper available from the WSC. The Techdoc is TD103528 and it is at URL <http://www.ibm.com/support/techdocs>.

My favorite session today is the z/OS V1.9 Record your SMF data to the System Logger.

It sounds like a fabulous implementation and the section provided detailed information on how to do this. Again, detailed planning is required, but I think it will really simplify the task especially for big IT installations that have to maintain their SMF data for 7 years.

I attended several DB2 sessions today. The first was "Ninety Minutes of Tuning Recommendations for DB2 for z/OS Version 8. This presentation covers many performance considerations for migrating from compatibility mode to the new function mode. There were also tuning tips on CPU and virtual storage considerations.

The second session was "DB2 Data Sharing for Availability". It discussed availability benefits of DB2 Data Sharing and also some of the new enhancements. In addition, we learned some of the new DB2 Version 9 Data Sharing Highlights.

Another BIG day!!

Friday August 17th

Only half a day today and SHARE is over. Time to say goodbye to all my friends and old colleagues.

I started off with an excellent presentation on TCP/IP considerations for the CICS Systems Programmer. Lots of technical details on how TCP/IP communicates into a CICS region as well as how to use the CICS Sockets Domain and CICS Sockets.

Next I went to the Cheryl Watson Hot Flashes session which is given every Friday during SHARE week. A survey is done to determine what level operating system and what hardware everyone is running. The results can give you a good idea of what large IBM installations are doing. In general, many shops are using a z9 EC model migrating from a z900. Usage of the zAAP and zIIP specialty processors is going up, especially the zIIP.

Not too many people are using IRD CPU Management, or Variable WLC Pricing, or On/Off Capacity on Demand.

Some data processing installations have reclaimed 60 MIPS using APAR OA18452 to change the IEAOPTxx value for RMPTTOM. This is discussed above in Monday's session and is documented in WSC FLASH 10526.

Other installations have reported significant MIPS savings (40 MIPS or more) by updating the

undocumented IEAOPTxx members for real storage as documented in Monday's session also. See WSC Flash 10598.

Also documented are fixes for ZFS performance. ZFS is the IBM strategic direction and HFS use should be converted to ZFS. IBM has provided a utility to do this. There are also new commands for measuring ZFS performance. This is discussed in WSC Flash 10557.

My final session was "CICS Nuts, Bolts, and Gotchas". This session discussed some implementation issues and problems encountered with CICS TS V3.2. We also discussed which functions in CICS have been and will be made Threadsafe in CICS.

It was a great SHARE week and I feel very grateful for the opportunity to attend. IBM and the IBM USA user community really put on a wonderful convention.

Hope you find this summary useful!!



使用 ISPF EDIT Macro 避免对重要数据集的无意修改



百硕资深工程师：王晓兵

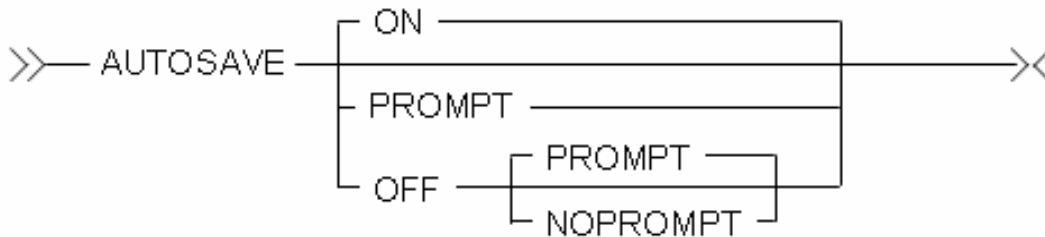
在 IBM 主机 z/OS 环境中，通常对数据集的修改都是通过 ISPF EDITOR 进行的。在修改系统数据集参数的时候，我们需要非常谨慎，尤其是对系统 PARMLIB、PROCLIB、VTAMLST 以及 SMS ACS Routines 等数据集的修改。

在缺省的 ISPF EDITOR 的 EDIT 模式下，对 PDS 进行了有意或者无意的修改之后，使用 PF3 (END) 在退出修改界面的同时，一般会自动对修改的内容进行保存。相信很多用户都有这样的教训：在还没有完成修改，或是修改后没有进行检查，或者根本没有意识到自己已经对数据集进行了修改的情况下，由于使用了 PF3 而对数据集进行了不应有的保存。

如何在修改重要数据集的时候，使热键 PF3 退出时让自动保存的功能失效，强制用户在退出之前，必须键入 SAVE 命令才能对修改的数据集进行保存呢？以下描述如何通过客户化 ISPF Site-wide Initial Macro 的方法来实现该功能。

1、ISPF EDITOR 的 AUTOSAVE 模式

ISPF 提供了名为 AUTOSAVE 的 Primary Command，来设置 ISPF EDITOR 是否自动保存数据集，该命令的语法如下：



各参数含义如下：

- ✧ ON: 即设置为 AUTOSAVE 模式，用户在 END 修改 Session 的时候，自动保存被修改的数据集
- ✧ OFF PROMPT: 与 PROMPT 设置相同，该模式下，用户如果修改了数据，必需在 END 之前使用 SAVE 保存数据集，或者使用 CANCEL 取消修改，否则无法使用 END
- ✧ OFF NOPROMPT: 该模式下，用户使用 END 等同于 CANCEL，即不保存修改内容，除非在 END 之前键入 SAVE

AUTOSAVE 的设置可以配置在 ISPF Profile 中，也就是说如果将 ISPF EDITOR 的 AUTOSAVE 设置为 OFF。就可以实现用户在修改了数据集之后，必需使用 SAVE 才能对修改的内容进行保存。实际上 AUTOSAVE 也是 ISPF EDITOR 的 Profile 设置选项之一，在如下界面 (Figure-1) 中显示当前 Profile 设置的 AUTOSAVE 为 “AUTOSAVE OFF PROMPT”：

```

会话 B - [32 x 80]
文件(F) 编辑(E) 查看(V) 通信(C) 操作(A) 窗口(W) 帮助(H)
File Edit Edit_Settings Menu Utilities Compilers Test Help
EDIT      SYS1.PARMLIB($$$$COIBM) - 10.01                Columns 00001 00072
***** ***** Top of Data *****
=PROF> ...PARMLIB (FIXED - 80)...RECOVERY OFF WARN...NUMBER DISPLAY STD...
=PROF> ...CAPS ON...HEX OFF...NULLS ON STD...TABS OFF...
=PROF> ...AUTOSAVE OFF PROMPT...AUTONUM OFF...AUTOLIST OFF...STATS ON...
=PROF> ...PROFILE UNLOCK...IMACRO NONE...PACK OFF...NOTE ON...
=PROF> ...HILITE OFF CURSOR FIND...
==MSG> -Warning- The UNDO command is not available until you change
==MSG>         your edit profile using the command RECOVERY ON.
000110 /** 5751-CS1,5751-CS2 (C) COPYRIGHT IBM CORPORATION 1978, 1984
000120 /** ALL RIGHTS RESERVED.
000130 /** NOTE TO U.S. GOVERNMENT USERS .. DOCUMENTATION RELATED TO
000131 /** RESTRICTED RIGHTS .. USE, DUPLICATION OR DISCLOSURE IS SUBJECT
000132 /** TO RESTRICTIONS SET FORTH IN GSA ADP SCHEDULE CONTRACT
000133 /** WITH IBM CORP.
000134 /**
000135 /** THE MATERIAL IN THIS FILE IS COPYRIGHTED.
000136 /**
000137 /** PERMISSION IS GRANTED TO:
000138 /**
000139 /** * STORE THE COPYRIGHTED MATERIAL IN YOUR SYSTEM AND DISPLAY
000140 /**     IT ON TERMINALS.
000150 /**
000160 /** * PRINT ONLY THE NUMBER OF COPIES REQUIRED FOR USE BY THOSE
000170 /**     PERSONS RESPONSIBLE FOR INSTALLING THE IBM PROGRAMMING AND
000180 /**     LICENSED PROGRAMS FOR WHICH THIS MATERIAL HAS BEEN PROVIDED.
Command ==>                                     Scroll ==> CSR
F1=Help      F2=Split      F3=Exit      F5=Rfind     F6=Rchange   F7=Up
F8=Down      F9=Swap       F10=Left    F11=Right   F12=Cancel
M B          英文 半形                          30/019
已用端口 3270 连接到了远程服务器/主机 打印到磁盘 - 附加

```

Figure-1

了解了 AUTOSAVE 的设置之后，我们需要做的是：让 AUTOSAVE 设置仅在修改了重要的系统数据集时设置为“OFF”，而在其他情况下仍保留用户自己的 Profile 设置。

2、修改 ISPF 的 Site-wide Initial Macro

ISPF 相关的配置选项是通过 ISPF Configuration Table 进行控制的，在 ISPF 中使用 TSO ISPCCONF 可以启动 ISPF Configuration Utility，在该 Utility 下用户可以对 ISPF Configuration Table 进行客户化设置，其界面如下（Figure-2）：

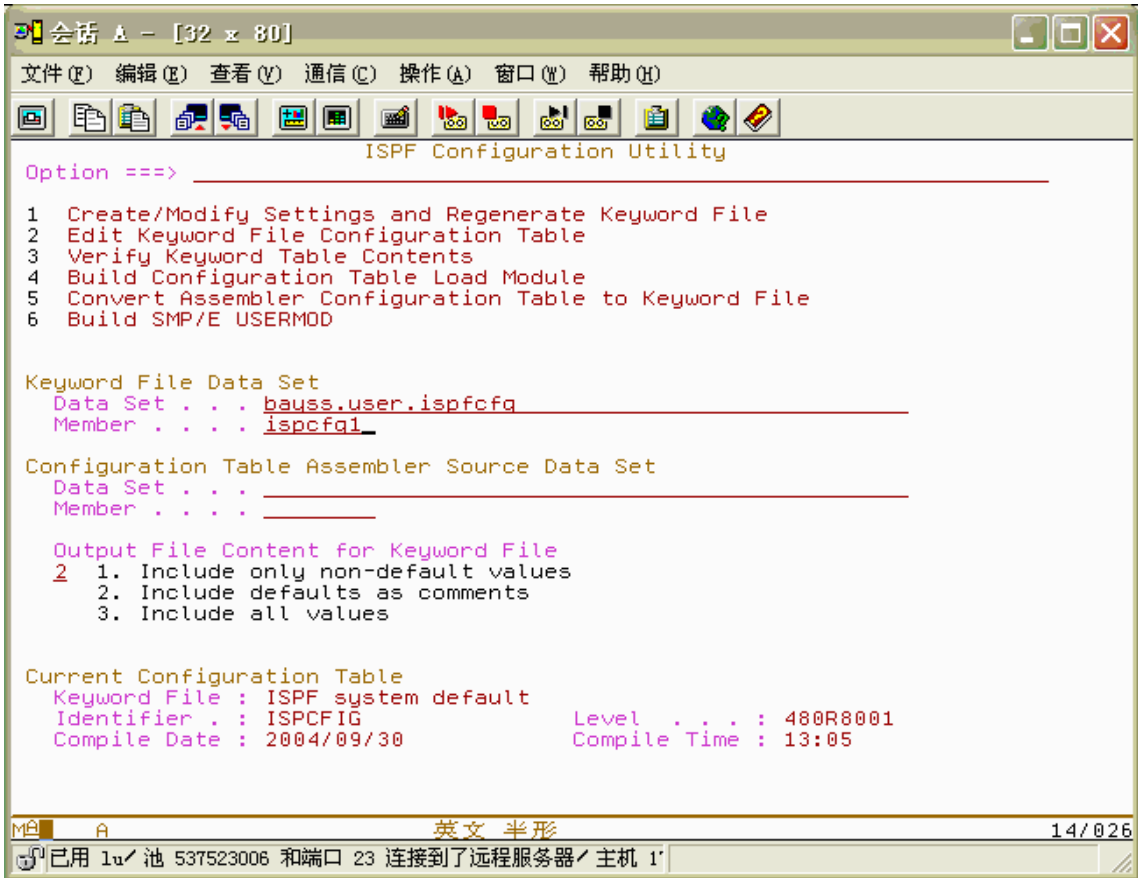


Figure-2

以上界面显示当前系统的 ISPF Configuration Table 使用的是系统缺省的配置表：ISPCFIG，该表以 Load Module 的形式保存在缺省的系统“ISP.SISPLPA”数据集中。用户可以通过 ISPF Configuration Utility 对 ISPF Configuration Table 进行修改。客户化生成的 ISPF Configuration Table (ISPCFIGU) 必需保存在 MVS 的搜索链库中，或是在用户 LOGON PROCEDURE 的 ISPLLIB 库链中。

在 ISPF Configuration Table 中的 Edit Settings 中，有一个配置选项为 Site-wide Initial Macro，在该选项中指定的 Edit Macro 将在所有用户使用 ISPF EDITOR 时被执行，通常用于强制修改已经存在的 Profile，从而在全系统范围执行标准规则。Edit Macro 可以是 CLIST 或 REXX 程序，也可以通过编程语言（如 PL/I、COBOL、FORTRAN、APL2、Pascal 或 C）来实现，这样的 Edit Macro 称为 Program Macro。编写好的 Edit Macro 所在的数据集名需要列在相应的 SYSPROC、STEPLIB 中的 DD 语句链中，或者保存在 LNKLIST 和 LPA LIST 中。

Site-wide Initial Macro 的指定可以通过在 Figure-2 中选择“1”，创建/修改 Keyword File (Figure-3)：

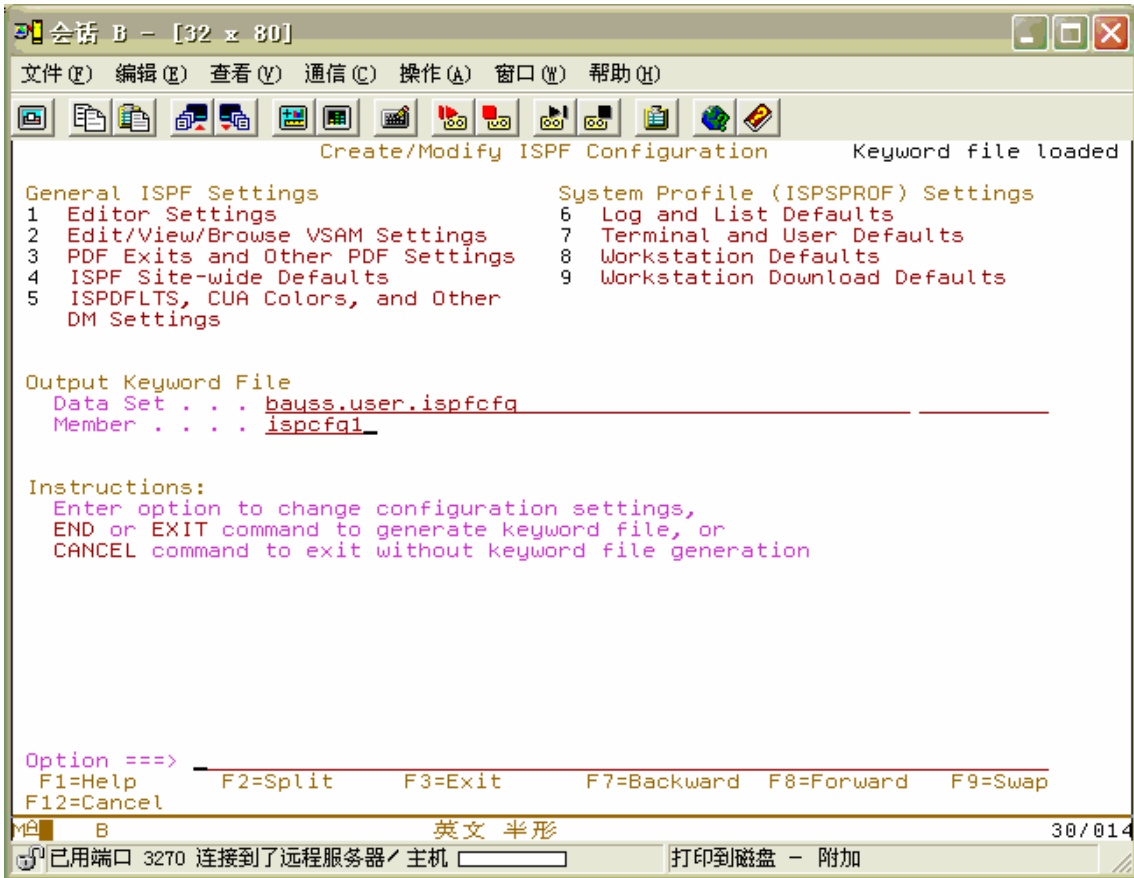


Figure-3

在 Figure-3 界面选择“1”，进行 Editor Settings，Editor Settings 界面中可以对使用的 Site-wide Initial Macro 进行指定，如下（Figure-4）所示：

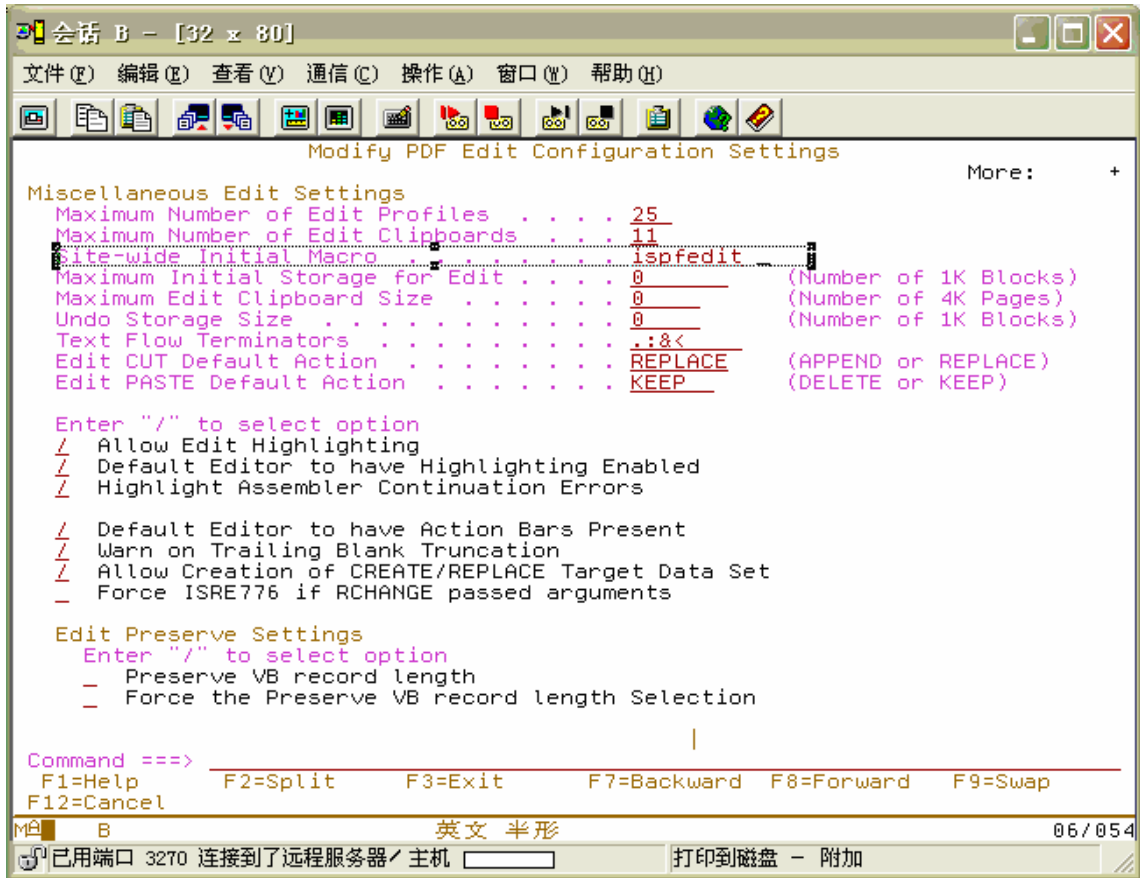


Figure-4

在以上界面中指定的 Site-wide Initial Macro 是名为“ISPFEDIT”的 REXX 程序。在该程序中对当前 EDIT 的数据集名称进行判断，如果是用户指定的重要数据集，则设置 AUTOSAVE 为 OFF 状态，否则设置 AUTOSAVE 为 ON；另外该程序还对当前操作的系统“SYSID”进行判断，只有与 SYSID 匹配（如以下程序中为 BAY1 和 BAYP）的系统才进行这些处理。程序实现代码如下：

```

/* rexx  Bayshore ISPF EDIT Macro */
/* To set up the environment. */
Address ISREDIT "MACRO"
Address ISPEXEC
/* Error set to return */
"CONTROL ERRORS RETURN"
/* Only do this for the concerned systems. */
"VGET ZSYSID SHARED"
If ZSYSID <> 'BAY1' & ZSYSID <> 'BAYP' Then Return
Address ISREDIT
"(DATASET) = DATASET"
Select
  When DATASET = 'SYS1.PARMLIB' Then "AUTOSAVE OFF"
  When DATASET = 'SYS1.PROCLIB' Then "AUTOSAVE OFF"
  When DATASET = 'SMS.CNTL' Then "AUTOSAVE OFF"
  Otherwise "AUTOSAVE ON"
End
Return

```

将上述程序保存在 Logon Procedure 的 SYSPROC 库链中。

在 Figure-2 界面下选择“4”，该选项将对 Keyword File ISPCFG1 进行编译，生成 ISPF Configuration Table 的 Load Module。生成的 Load Module（名为 ISPCFIGU）保存在 TSO LOGON PROCEDURE 的 ISPLLIB 库链中。也可以通过 ISPF Configuration Utility 将 Keyword File 源和目标 ISPF Configuration Table 以 USERMOD 的方式在系统 SMP/E 环境中进行记录，从而将 ISPF Configuration Table 的变更纳入到标准的系统软件版本管理之中。

用户在使用经过上述修改之后的 ISPF Editor 时，如果对 BAY1 和 BAYP 系统的 SYS1.PARMLIB、SYS1.PROCLIB 或 SMS.CNTL 的 Member 进行了任何修改，在 PF3 退出（END）的时候，ISPF 会提醒用户“Data changed”而无法退出，用户可以键入 SAVE 指令对修改的内容进行保存，或是键入 Cancel 取消修改，从而防止系统程序员对这些重要系统数据集的无意修改而产生的错误。





主机汉字转码

百硕资深工程师: 贺明

国内主机用户使用的计算机平台包括使用 EBCDIC 码制的 IBM z 系列的主机, 和众多使用 ASCII 码制的开放平台的服务器。因此会经常遇到 EBCDIC 与 ASCII 码之间汉字转码问题。本文将探讨在主机 z/OS 操作系统上对于汉字转码的几种实现方法。

1. 汉字编码和 CODEPAGE

目前, 许多国家和地区从方便本国和本民族应用的角度出发, 制定了相应的编码标准和内码体系。如美国的 ASCII, 中国的 GB2312-80 等作为该国家或区域内信息处理的基础, 有着统一编码的重要作用。字符编码集按长度分为 SBCS (单字节字符集)、DBCS (双字节字符集)、MBCS (多字节字符集)。

1980年, 我国颁布了第一个汉字编码字符集标准, 即 GB 2312-80《信息交换用汉字编码字符集基本集》。GB2312(1980年)一共收录了 7445 个字符, 包括 6763 个汉字和 682 个其它符号。1995 年的汉字扩展规范 GBK1.0 收录了 21886 个符号, 它分为汉字区和图形符号区。汉字区包括 21003 个字符。2000 年的 GB18030 是取代 GBK1.0 的正式国家标准。该标准收录了 27484 个汉字, 同时还收录了藏文、蒙文、维吾尔文等主要的少数民族文字。从 ASCII、GB2312、GBK 到 GB18030, 这些编码方法是向下兼容的, 即同一个字符在这些方案中总是有相同的编码, 后面的标准支持更多的字符。在这些编码中, 英文和中文可以统一进行处理。区分中文编码的方法是高字节的最高位不为“0”。GB2312、GBK 属于双字节字符集(DBCS), GB18030 是多字节字符集 (MBCS)。

对于各种编码字符集, z/OS 引进了 Codepage/CCSID, 规定各种字符集合。表 (一) 是 z/OS 对汉字提供支持的 Codepage 列表:

Table 1 Codepage for Chinese

Support for:	file_system_codepage(EBCDIC)	network_transfer_codepage(ASCII)
Chinese Standard GB18030	IBM-1388,UTF-8	IBM-5488
BIG5	IBM-937	IBM-950
SCHINESE(GB2312)	IBM-935	IBM-1381
GBK	IBM-935	IBM-1386
TCHINESE	IBM-937	IBM-948

EBCDIC 对于 DBCS, MBCS 使用 shift-in, shift-out 作为和 SBCS 的分隔符, 包括 DBCS, MBCS 的字符从 ASCII/EBCDIC 转换的过程中, 长度会发生变化。

2. z/OS FTP 对汉字转码的支持

◆ GB2312, BIG5 的支持

首先要配置 FTP 的 TCPDATA 参数 LOADDBCSTABLES 装载相应的 DBCS 转码表, 相应汉字的参数值是 BIG5, SCHINESE, TCHINESE。

以下是和汉字转码相关的客户端子命令和相应服务器子命令:

Table 2: FTP command for Chinese character data conversion

Support for:	Client subcommand	Server command	Description
BIG5	BIG5	TYPE B 8	Big-5 transfer type
SCHINESE(GB2312,GBK)	SCHINESE	TYPE B 9	Simplified Chinese transfer type
TCHINESE	TCHINESE	TYPE B 7	Traditional Chinese transfer type

- 主机作为 FTP 客户端：主机侧先输入命令 SCHINESE，然后再进行 PUT 或者 GET。转码工作将在主机一侧，按照转码表自动进行。
- 主机作为 FTP 服务器：客户端输入 QUOTE TYPE B 9 通知主机 FTP 服务器使用简体中文转码，然后客户端再进行 PUT 或者 GET。转码工作将在主机一侧，按照转码表自动进行。

◆ GB18030, UTF 的支持

z/OS V1R4 Communication Server 支持 GB18030 的数据传输。FTP 通过 LOCSITE, SITE 命令参数 ENCODING=MBCS, MBDATACONN=(IBM-1388,IBM-5488)提供对 GB18030 码集的转码支持。LOCSITE,SITE 分别用于指定客户端和服务端提供相应的服务要求，对于转码来说，就是指定转码方式和相应的转码码集。

- 主机作为 FTP 客户端：主机侧先输入命令 LOCSITE ENCODING=MBCS, LOCSITE MBDATACONN = (IBM-1388,IBM-5488)，然后再进行 PUT 或者 GET。转码工作将在主机侧自动进行。
- 主机作为 FTP 服务器：客户端输入 QUOTE SITE ENCODING=MBCS, QUOTE SITE MBDATACONN = (IBM-1388,IBM-5488)，通知主机 FTP 服务器使用简体中文转码，然后客户端再进行 PUT 或者 GET。转码工作将在主机侧按照自动进行。

ENCOING, MBDATACONN 参数也支持传输转码 BIG5, GBK, TCHINESE, 按照表一中参数值设置相应的 MBDATACONN 参数值。

需要说明的是，MBCS 的数据传输只支持 VB、V、U 文件，不支持 FB 文件类型。

3. ICONV 工具和函数

◆ ICONV 工具

iconv 是 z/OS 提供进行码制转换的命令和函数。他将输入文件的字符从指定的码集转到另一个码集，然后输出到输出文件中。SBCS 的转码输入、输出文件长度相同，但 DBCS 的转码输入、输出因为 shift-out 和 shift-in 长度将发生变化。

iconv 工具可以在 z/OS BATCH、TSO、z/OS SHELL 中运行。

- z/OS BATCH
JCL 过程 EDCICONV 将调用 ICONV 工具进行转码，参数是 INFILE, OUTFILE, FROMC, TOC 分别表示输入，输出文件，输入文件的当前数据码集，输出文件的结果码集。
- TSO
TSO CLIST ICONV 调用 ICONV 工具进行转码。
格式是 ICONV infile outfile FROMCODE(fromcode) TOCODE(tocode)
- z/OS USS SHELL
命令格式：iconv [-sc] -f oldest -t newest [file ...] 或者 iconv -l

iconv -l 列出所有支持转换的 codepage，这里面就包括 GB2312, BIG5, TCHINESE, GB18030 的 codepage。

使用如下命令：iconv -f IBM-1388 -t IBM-5488 file1 > file2 就可以将 EBCDIC 的 GB18030 汉字转换成 ASCII 的 GB18030。反过来使用 iconv -f IBM-5488 -t IBM-1388 file1 > file2 就可以将 ASCII 的 GB18030 转换成 EBCDIC 的 GB18030 汉字。

DBCS 文件的输出 ICONV 只支持变长文件。

◆ ICONV 函数

z/OS UNIX SERVICE 同时提供一套 C 语言的 iconv 函数，可以用在程序中对字符串进行相应的转码。这些函数是 iconv_open, iconv, iconv_close. 这样可以根据转码需求编写一个子程序，对字符串进行转码。以下是针对 GB18030 转码的伪码实现：

定义相关变量

```
char *inptr; /* Pointer used for input buffer */
char *outptr; /* Pointer used for output buffer */
size_t inleft; /* number of bytes left in inbuf */
size_t outleft; /* number of bytes left in outbuf */
iconv_t cd; /* conversion descriptor */
```

```
if ((cd = iconv_open("IBM-5488", "IBM-1388")) == (iconv_t)(-1)) {错误处理}
rc = iconv(cd, &inptr, &inleft, &outptr, &outleft);
if (rc == -1) {转码失败，错误处理}
iconv_close(cd);
```

4. CICS 对汉字转码的支持

◆ 使用 CONTAINER 进行转码

CICS TSV3.1 提供了 CONTAINER，通过 PUT/GET CONTAINER 可以帮助我们传递超过 32K 的数据，默认情况下不进行数据转换。PUT/GET CONTAINER 提供参数 DATATYPE, FROMCCSID, INTOCCSID 进行码值转换。

- CICS 自动进行字符串的转换（一般适用于 CICS 之间的互连）
 - a) 客户端的程序，PUT CONTAINER 时指定参数 DATATYPE(DFHVALUE(CHAR))或者 CHAR，这里不需要指定 FROMCCSID，客户端 CICS 将根据默认的 CCSID 存储数据（由 SIT 的 LOCALCCSID 指定）。

比如：EXEC CICS PUT CONTAINER(cont_name) CHANNEL(chan_name)
FROM(input-data1) CHAR
 - b) 客户端程序 LINK 服务器程序，指定 CHANNEL(chan_name)。
 - c) 服务器端的程序，直接 GET CONTAINER(cont_name) INTO(input-data2).数据将按照服务器平台的 CCSID 格式存储到 data2。如果码制不同，数据转换将自动进行。
 - d) 服务器端的程序，使用 PUT CONTAINER CHAR 将返回数据放到输出 CONTAINER。
 - e) 客户端程序使用 GET CONTAINER 将输出 CONTAINER 里面的数据按照客户端的 CCSID 存储到参数变量中。
- 使用 CONTAINER 进行转码（主动需要对字符串进行转码）
 - a) 首先 PUT CONTAINER(temp) CHAR FROMCCSID(codepage1) FROM(input-data). 将码值为 codepage1 的数据存入临时的 CONTAINER。
 - b) 然后 GET CONTAINER(temp) INTOCCSID(codepage2) SET(data-ptr) FLENGTH(output-len)

对于汉字转码，我们分别使用对应的 CODEPAGE 参数或者配置好 LOCALCCSID 就可以进行相应的码制转换。

◆ CICS/EBCDIC 和 CICS/ASCII 互连的转码

CICS 互连总共有以下 5 种方式：

- ✓Function shipping
- ✓Transaction routing
- ✓Distributed program link (DPL)
- ✓Asynchronous processing
- ✓Distributed transaction processing (DTP)

其中 Transaction Routing 方式下，CICS on OS/390 并不做数据转换，转换由 ASCII 系统进行。我们可以将 Asynchronous Processing 方式看作是一种特别的到远端系统发起 START 命令的 Function Shipping。数据通过 RETRIEVE 进行读取。DTP 作为更复杂的一种 APPC 通话，对应用的用户数据并不提供转码，由应用程序自己负责相应的转码工作。

- ✓ ECI 外部调用方式的码制转换和 DPL 一样，COMMAREA 区域的转换 CICS 通过 DFHCNV 来决定如何转换。
- ✓ EPI 则是由 TYPETERM 定义中的 CGCSGID 来决定服务器的 CODEPAGE。客户端的 CODEPAGE 由客户系统所决定。

CICS 客户端服务器模式主要有两种方式，ECI 和 EPI:

CICS 通讯一般发生在 SNA 连接中，假设系统编码的数据是 EBCDIC 码值。CICS/ASCII 翻译了除应用数据外所有的数据，而应用数据由接收系统进行翻译。表 3 显示在 Function Shipping, DPL 下的数据转换。

Table 3: Data conversion for function shipping and DPL

Request type	Data	Conversion type	Where converted
TS	Queue name	Character	ASCII system
TS	IOAREA	As specified in DFHCNV table	Receiving system
TD	Queue name	Character	ASCII system
TD	IOAREA	As specified in DFHCNV table	Receiving system
FC	File name	Character	ASCII system
FC	IOAREA	As specified in DFHCNV table	Receiving system
FC	Key	As specified in DFHCNV table	Receiving system
IC	Transaction ID	Character	ASCII system
IC	FROM area	As specified in DFHCNV table	Receiving system
IC	RTERMID, RTERMID, REQID	Character	ASCII system
PC	Program name	Character	ASCII system
PC	COMMAREA	As specified in DFHCNV table	Receiving system

从 CICS/ASCII 到 CICS on OS/390 的 function shipping 和 DPL，ASCII 系统将转换所有的资源名字，CICS on OS/390 将使用 DFHCNV 来转换用户数据。

而从 CICS on OS/390 到 CICS/ASCII 的 Function Shipping 和 DPL，CICS ASCII 系统来做必要的码制转换。

通讯区的转换是按照字段来做的，必须确保转换后的通讯区长度能够容纳转换后的结果长度。良好的应用设计可以避免不必要的的数据转换，比如 CICS OS/390 只是为 CICS/WINDOWS 作为 File Manager，因此存储在文件中的数据就可以编码为 ASCII，避免不必要的的数据转换。

通讯区需要码制自动转换，都需要通过定义 DFHCNV MACRO 来告诉 CICS 如何转换通讯区。DFHCNV 的参数 SRVERCP 指定 SERVER 方的 CODEPAGE，而 CLINTCP 则指定 CLIENT 方的 CODEPAGE。CICS 支持表一中的汉字 CODEPAGE 转码，对于 GB18030 (IBM-1388, IBM-5488) 之间的转码，需要 CICS TS FOR z/OS V2R3 以上版本支持。

CICS 提供了默认的 DFHCNV，SOURCE 在 SDFHSAMP(DFHCNVW\$)，这是用于 CICS DFHWBADX 调用程序 DFHWBHH，DFHWBUD 解析原始的 HTTP 请求，调用将数据转码输出给 HTTP 客户端，而其中的 HTTP 客户端码制是 8859-1，标准 ASCII 拉丁字符，服务器端是 037，EBCDIC 码值的拉丁字符。以下是 CICS 为支持 HTTP 转码提供的源代码 DFHCNVW\$:

```
DFHCNV TYPE=INITIAL
DFHCNV TYPE=ENTRY, RTYPE=PC, RNAME=DFHWBHH, USREXIT=NO, *
SRVERCP=037, CLINTCP=8859-1
```

```
DFHCNV TYPE=SELECT, OPTION=DEFAULT
DFHCNV TYPE=FIELD, OFFSET=0, DATATYP=CHARACTER, DATALEN=32767, *
    LAST=YES

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

CICS 默认 HTTP 的只支持英文转换，我们只需要修改 SRVERCP，CLINTCP 为表一中的中文 CODEPAGE 对，比如(935,1381)就能为 HTTP 访问成功显示汉字。

在以上 DFHCNV TYPE=FINAL 前我们增加以下定义来支持字符串通讯区进行 GB18030 自动转码：

```
DFHCNV TYPE=ENTRY, USREXIT=NO, RTYPE=PC, *
    SRVERCP=1388, CLINTCP=5488
DFHCNV TYPE=SELECT, OPTION=DEFAULT
DFHCNV TYPE=FIELD, OFFSET=0, DATATYP=CHARACTER, DATALEN=32767, *
    LAST=YES
```

这样 DPL，ECI 的调用就能对 COMMAREA 区域自动进行 GB18030 的转码。

如果 COMMAREA 区中包括字符，数值等，则定义指定的 RNAME，然后通过书写多个 FIELD，指定相应的 OFFSET 来对应相应 COMMAREA 区域的字段，指定相应的 DATATYP，这样 CICS 就会自动根据定义进行拆分转码。



有关 Storage 的 四个问题

百硕外籍技术专家 James Smith



本期技术专家将为您解答 Storage 方面的一些常见问题，希望对您的日常工作能够提供帮助。

问题 1: A commonly asked question is should my data be SMS managed?

专家解答:

A storage environment without system-managed storage is analogous to an airport without air traffic controllers. Allocations and deletions occur with little or no control, on whichever volume the person performing the allocation happens to choose. Some volumes may be highly utilized in terms of both space and performance while others are sitting idle. In a storage environment, a collision can be said to occur when a data set allocation fails because there is no space on the volume on which the allocation was attempted.

It must also be noted that many functions currently being introduced for DB2 are only available for SMS managed volumes.

问题 2: What percentage of volumes should not be SMS managed?

专家解答:

A difficult question to answer directly but you should consider the following to be non-SMS managed.

Catalogues, LOGREC, Page datasets, Program products, SMP/E, SPOOL, Sub-system libraries, logs and journals, SYSPLEX control data sets and of course SYSRES volumes.

Everything else works fine being SMS managed.

问题 3: How many Storage Groups do I need and how big should they be?

专家解答:

The answer depends on your environment but normally around 8 – 10 is sufficient for even a really large data centre with many applications and is certainly enough for most Chinese data centres. You do not need Storage Groups separated by application – this is a ridiculous concept – and thoroughly defeats the purpose of automated storage.

IBM provides a number of good, although a bit old, Redbooks on the subject called DFSMS FIT (Fast Implementation Techniques) in which are described valid techniques for splitting data.

In general, the bigger the pool the better. Try to avoid lots of small pools. Why? Because you can run a large pool at a higher occupancy level without space problems, and that saves money. If you have a 5 volume pool which holds 40GB, then 20% free space is 8GB. That is not a lot, especially when the space gets fragmented. If you run a 500GB pool at 90% occupancy, then you have 50GB free. What's right for the occupancy level depends very much on the type of data in the pool. Databases tends to be well behaved and predictable, so large database pools can be run at 90% to 95%. General purpose pools can be volatile, and need more free space. You need to analyze your own pool usage and see what's best for your site.

What you don't need are pools for DUMPs, pools for specific products, pools for LOGS, this type of split makes no sense at all.

问题 4: How many Storage Classes should I define?

专家解答:

Storage classes perform three functions. They decide if data should be SMS managed or not, they decide what level of performance a file should have, and they decide if you can override SMS and place data on specific volumes.

You really only need one STANDARD (DEFAULT) storage class, one storage class for GUARANTEED SPACE, one or more for CACHE sets and perhaps one for STRIPING.

Despite rumors to the contrary there is no direct relationship between a STORAGE CLASS and STORAGE GROUP and no logical reason for them to have the same name.

Storage Class provide a number of parameters for setting performance related objectives such as DIRECT, SEQUENTIAL and INITIAL response. These definitions are largely ignored for modern DASD.

So if you have a large number of STORAGE CLASSes define then please think again and go back to review your definitions.



在大家的通力配合下，《百硕客户通讯》已经成功出版了八期。也有越来越多的读者希望能够在《百硕客户通讯》上表达自己的意见，阐述自己的观点，与大家一起分享自己的经验。因此，我们在第九期新增设了《来稿选登》专栏，希望选登一些对大家实际工作有帮助的文章。感谢大家长期以来的支持与帮助，希望《百硕客户通讯》能够成为您忠实的朋友。同时，欢迎大家积极投稿，您的支持将是我们成长的最大动力。

本期选登的文章是来自 IBM 公司软件部郑宁的《Tivoli Workload Scheduler 端到端作业调度解决方案》。

在数据大集中之后，随着跨平台应用的拓展，批量管理是数据中心 IT 管理链路中相对薄弱的环节。在本文中，IBM 软件部的工程师介绍了 IBM 端到端作业调度解决方案的架构和数据流程，以期能为困扰于此的 IT 人员提供参考。



Tivoli Workload Scheduler 端到端作业调度解决方案

国际商业机器全球服务（中国）有限公司，软件部：郑宁

作业调度是数据中心的核​​心任务之一。在一个企业级（以银行为例）的 IT 环境中，包含着许多不同的应用系统，这些应用处理不同的业务（电子银行、报表打印、帐户处理等），运行在不同的平台上（例如，z/OS, AS400, AIX, WINDOWS 等等）。它们彼此相对独立，同时又相互联系。

例如，电子银行运行在 AIX 平台，该系统的输出可能会作为“帐户处理”应用系统的输入，而帐户处理程序运行在主机上，报表打印程序运行在 WINDOWS 平台，而它的输入是主机批处理程序的结果。

随着新业务的不断推出，类似这样跨平台应用系统的联系会越来越多。如何集中管理跨平台的作业调度，如准确高效地运行这些相互联系的跨平台作业，以满足不断推出的新业务，保证企业的竞争力，就成为一个越来越紧迫的问题摆在了数据中心 IT 管理人员的面前。

针对这个问题，IBM 推出了 Tivoli Workload Scheduler(TWS) 端到端作业调度解决方案，本文从系统架构和数据流程两方面入手，详细介绍了如何利用 TWS 实现端到端的作业调度。

1. 系统组成

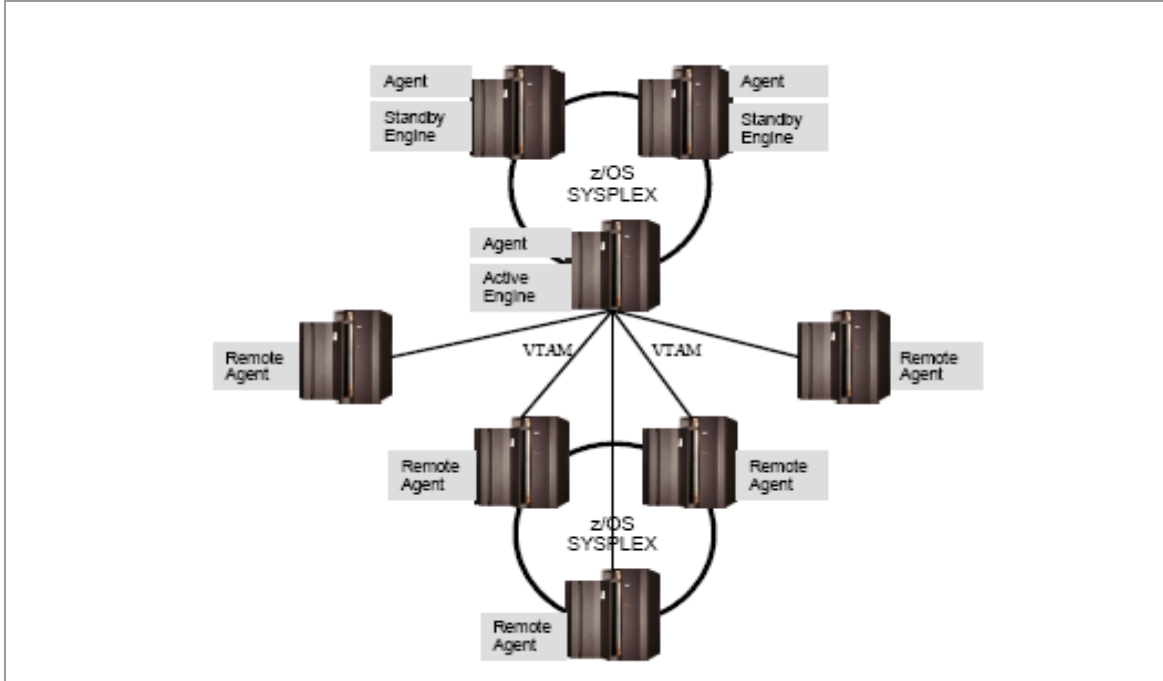
TWS 端到端解决方案包括两部分产品：

1.1 TWS for z/OS v8.2

该产品运行在主机端。它利用 VSAM 文件管理保存所有需要管理的作业的调度信息。包括作业之间的依赖关系，作业运行时间，所需资源的可用性信息等。所有的这些信息被用来生成“LONG TIME PLAN”。

“LONG TIME PLAN”包含了一段时间之内（一个月或几年）需要调度的作业的信息。数据中心的相关人员可以利用它做作业调度的长期计划。根据“LONG TIME PLAN”，TWS 每天会生成“Current plan”。通常，“Current plan”包含了 24 小时内需要提交的作业的详细信息。TWS 利用这些信息在适合的时间，适合的系统​​中自动提交作业。

其系统架构如下图所示：



如上图所示：TWS for z/OS 由以下两个主要部件组成：

➤ TWS for z/OS Agent

Agent 是 TWS for z/OS 的基本组成部分，也叫 Tracker。在 Sysplex 中，它必须运行在每一个 TWS for z/OS 控制的操作系统上。它记录了作业启动后的详细信息，同时，把这些信息传给 Engine，使得 PLAN 中的状态得到更新。

➤ TWS for z/OS Engine

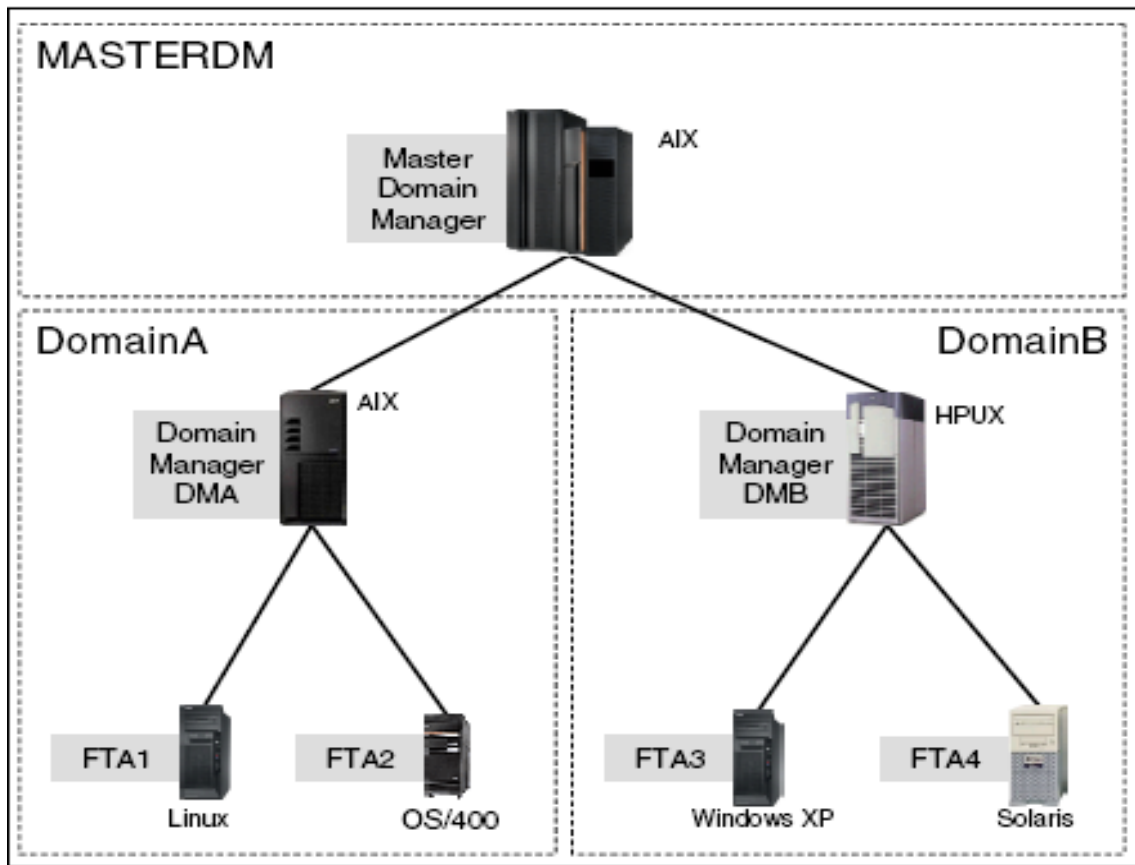
在 Sysplex 中，有一个系统被用来做 TWS for z/OS 的控制系统，Engine 就运行在这个系统中，它的另一个名称是“Controller”。

在一个 TWS 系统中，只需要一个 Controller。Engine 管理所有的相关数据，它同时负责在合适的时间将作业提交到合适的系统中。

1.2 TWS 开放端

该产品运行在开放平台。

开放端的 TWS 用来调度非主机平台的作业。非主机平台几乎包括了除主机之外的所有通用平台，例如，Windows，Unix，Linux 等。它的系统架构如下图：



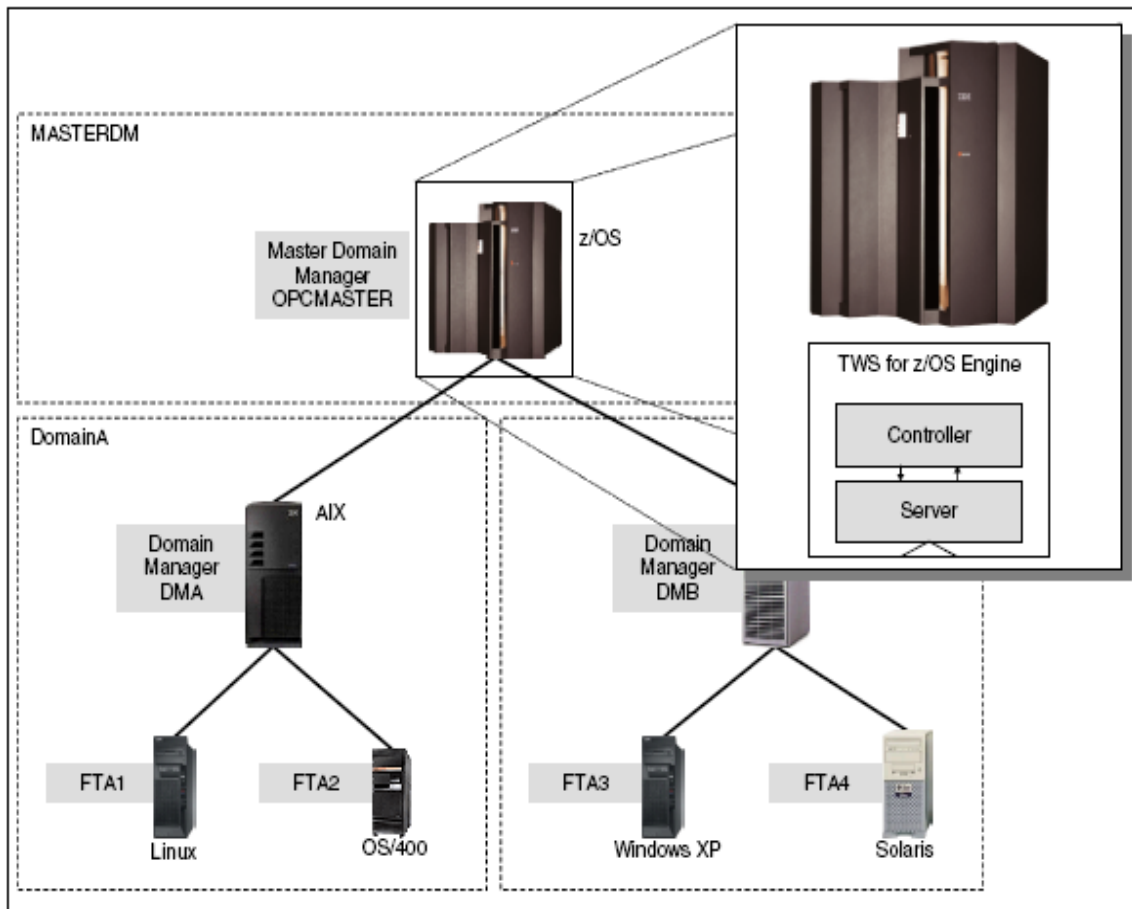
在一个 TWS 架构中存在如下主要概念:

MDM(Master Domain Manger): 该机器集中管理了所有需要调度的作业的信息; 它的功能包括定义,修改,存储作业调度信息, 每天生成计划文件, 下传到整个域中。在每个域中, 只能有一个 MDM。

DM(Domain Manager): 相当于一个路由器的作用, 把 MDM 生成的计划文件下发到 FTA 中。在一个域中, DM 的数量理论上没有限制。

Fault-tolerant agent (FTA): 提交并执行作业的物理机器。

2. TWS E2E 架构



在 TWS 端到端的解决方案中，沿用了 TWS 的域的概念。其中 MDM 必须是主机端的 TWS。在该方案中：

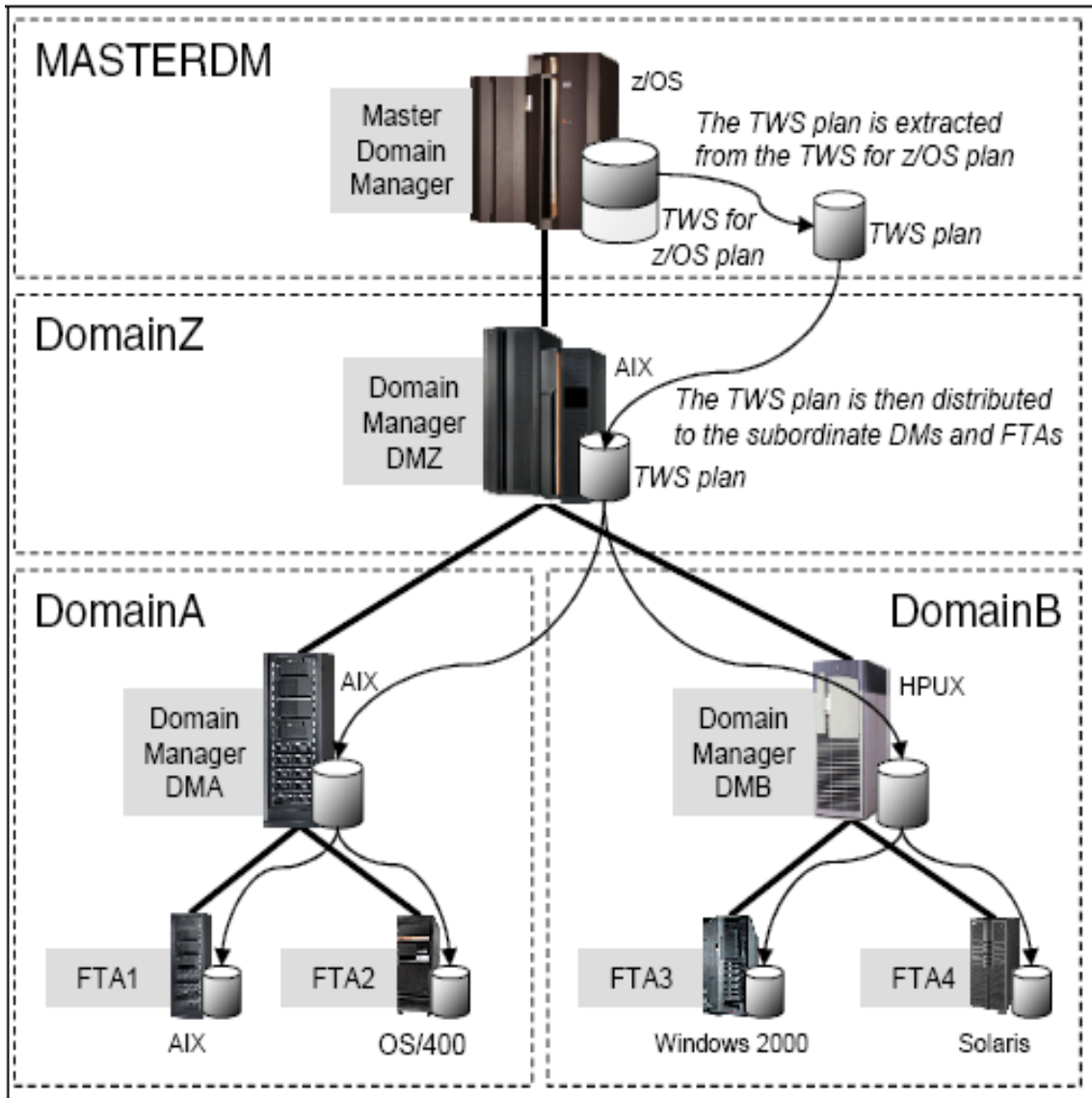
Controller: 集中管理跨平台的作业调度信息（包括主机和开放端），只有一个 Address Space。其生成统一的作业调度计划，通过 Server address space 下发到需要执行作业的开放端。

Tracker (FTA): 类似在每个主机的被控系统都有的 Tracker，在开放端称为 Fault Tolerance Agent (FTA)，其功能是接受 Controller 的作业调度计划，同时，将结果返回给 CONTROLLER，并具有一定容错能力。

Server: 作为主机和开放端连接的通讯系统，是一个主机端的单独的 Address Space。该部分是在 E2E 方案中独有的。Server 的功能是：将主机端 Controller 上生成的作业调度计划下发到开放端的 Agent。同时，将开放端作业的执行结果返回给主机端的 Controller。

3. TWS E2E 架构下作业计划文件的分发路径

下图显示了一个典型的 TWS E2E 架构下端到端作业计划文件的分发情况：



在示例中：

TWS for z/OS 作为 Master Domain Manager，负责全局的生产调度计划的制定，并完成主机端的作业调度，同时还向开放端的 TWS Domain Manager 发送生产调度计划。

AIX 平台的 Domain Manager 负责将生产调度计划发送到属于其管辖下的 FTA；并将管辖下 FTA 执行的信息反馈给 Master Domain Manager。

开放端（运行在 AIX、OS/400、Windows2000 和 Solaris 平台）的各个 FTA 按照 Domain Manager 下达的指令完成具体的作业运行，并将执行情况反馈给 Domain Manager。

该架构下，在 z/OS 主机端运行 TWS for z/OS 作为 Master Domain Manager，掌握着架构中所有平台系统下的作业工作计划和调度状态信息，成为整个生产调度的管理和监控中心，从而实现跨平台的作业调度的协调工作。

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