Parallel Sysplex - planning and implementing using SAS software

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COMLAB GmbH
### The clients serving company

**COMLAB GmbH**

**Strategic design and consultancy in the areas of:**

- Datawarehousing & IT controlling
- Parallel sysplex & goal mode migration
- Accounting & Tuning
- C/S concepts & implementation
- System products, vendor software

- **Quality Partner of SAS Institute**
- **Member of the S/390 Developers Association**
## Processing Paradigms

<table>
<thead>
<tr>
<th>MVS - Mainframes</th>
<th>Open Systems</th>
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</thead>
<tbody>
<tr>
<td><strong>Centralized Control</strong></td>
<td><strong>Industry standard applications</strong></td>
</tr>
<tr>
<td><strong>High HW Costs</strong></td>
<td><strong>Perception that Open Systems will decrease HW costs</strong></td>
</tr>
<tr>
<td>- expensive bipolar technology</td>
<td>- Decentralised processing options</td>
</tr>
<tr>
<td>- limited vendor competition</td>
<td>- Scalability</td>
</tr>
<tr>
<td>- locked into special HW architecture</td>
<td></td>
</tr>
<tr>
<td><strong>High SW Costs</strong></td>
<td><strong>- no 'open' standards</strong></td>
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</table>
## Processing Paradigms within Parallel Sysplex - now

- CMOS engines are extremely less expensive
- Ugrades are possible in smaller increments
- DASD becomes PC pricing
- Open Edition-MVS is as open as any UNIX or Windows based solution
- XPG4 and SPEC1170 are supported
- **MVS Reliability and Availability** is still offered
- PC-500/390 provides developers incentives
- Integrated C++ runtime libraries and graphical sysplex management (X-Windows etc.)
## Processing Paradigms

### Perceptions and Reality

**MVS systems are:**
- extremely expensive
- hard to control
- impersonal
- antiquated
- antiquated
- antiquated
- dead

**Reality:**
- most cost effective
- accountable
- fully automated
- compatible
- proven
- stable
- upwards compatible
- Western World runs on MVS
### Basic sysplex concepts

**What is a sysplex?**

- Two or more MVS images, coupled together for purposes of:
  - advanced multisystem applications
  - single system image
  - advanced recovery, reconfiguration
  - data sharing

- Basic sysplex: a sysplex with a small number of systems coupled together using CTCs to reach console consolidation and global resource serialization
Basic sysplex concepts

The sysplex timer

- Responsible for synchronization of all the TOD clocks within the CECs in a sysplex
- Timing is a very critical task within a sysplex (e.g., log structures and other shared sysplex components)
### Basic sysplex concepts

#### The coupling facility

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Recommendation</th>
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<tbody>
<tr>
<td>A coupling facility consists of:</td>
<td></td>
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<tr>
<td>a real memory subsystem with one or more processors (e.g. 9674) and special microcode (LIC)</td>
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<tr>
<td>central storage (if a virtual or LPAR based CF is defined expanded storage can also be used. However this is <strong>not recommended</strong> due to performance reasons.)</td>
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<tr>
<td>CF links (e.g. send, receive channels)</td>
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<tr>
<td>NO I/O subsystem, no virtual memory management - response objective demand is less than 1 ms!</td>
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</table>
Basic sysplex concepts

The CF storage types

- **Control storage**: MVS refers it as central storage for code and data
- **Expanded storage**: For data storage, not recommended because of performance penalties
- **Dump storage**: CF storage for SVC dump space
Basic sysplex concepts

The CF structures

- list structures for sharing data as a series of lists
- locking structures, for systemwide serialization
- cache structures, for high speed access data and buffer invalidation
Basic sysplex concepts
The XCF

- a single transport protocol is used by all subsystems
- once XCF is established an arbitrary number of applications can exploit it without any additional HW or system programming investment
- provides consistent recovery and restart
Basic sysplex concepts

The couple data sets

- All systems in a sysplex must share a primary (and an alternate) couple data set. The couple data set maintains the following information:
  - which systems are in the sysplex
  - which members are in the sysplex
  - which groups are in the sysplex
### Automation considerations

**MPF**

- MPF always gets control on the originating system. Decisions regarding messages are specified on the local system.
- JES3 5.2.1 GLOBMPF Parameter tells MPF to preprocess messages on both - the local and global systems. A console accepting all route codes must exist on the global.
- Messages are transported to foreign systems if a real console with the right MSCOPE and route codes exists.
Automation considerations

Message based through SSI

- Messages are presented to subsystems via **SSI Code 9** on the originating system and on all systems the messages are transported to.
Automation considerations
Netview

- Netview has no explicit support for the sysplex environment
  - CNMCSIR (Netview SSI Receiver task) should be defined with MSCOPE=*ALL
  - Check SYSIDs always carefully
  - AOC is a Netview Application to monitor S-Timer, the CFs and the CDS
Automation considerations
API capabilities

- Host management API capabilities
- The Netview RUNCMD facility as a vehicle to send commands to the HWMC
- The OS/2 REXX and SNMP API on the HWMC
Automation considerations

ARM MVS 5.2

- Restarts STCs or batch jobs on the same or different system if the task or the whole system failed.
- Requires an ARM CDS
- Requires the definition of an ARM policy
## MVS/ESA 5.n Enhancements

### Topics

- Exploiting the dynamic exit facility (5.1)
- Job support for STCs (5.1)
- Device self descriptor service
- Improvement of the hardware configuration dialogue (5.1 & 5.2)
- 4 digit device numbers (5.1)
- Jes common coupling services
- Exploiting dynamic dump datasets (5.1)
- Dump analysis and elimination enhancements (5.1)
<table>
<thead>
<tr>
<th>Topics continued</th>
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<tbody>
<tr>
<td>- Improval of the event notification facility (5.1)</td>
</tr>
<tr>
<td>- Sysplex loggers (5.2)</td>
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<tr>
<td>- Shared tape function (5.2)</td>
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<tr>
<td>- Shared pages function (5.2)</td>
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<tr>
<td>- SSI enhancements (5.2)</td>
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MVS/ESA 5.n Enhancements

WLM compatibility mode

- Exceptions:
  - **IEAICSnn** for started tasks the TRXNAME refers to the jobname of the STC not the procedure name. You can assign WLM Service Classes so WLM collects information about transactions. It is valid for CICS and IMS Transactions. It's a migration vehicle.

- **IEAIPSnn**: dispatching priorities are designed via the DP= keyword. APG and APGRNG are not supported.

- **IEAOPTnn**: CPENABLE has changed for PR/SM installations.
MVS/ESA 5.n Enhancements
SMF/RMF changes

- New type 72 Record, - in **compat mode** writes subtype 1 records, all PGNs show velocity & response time - in **goal mode** writes subtype 3, one record per service class with resource & response data

- SMF type 30 - if in goal mode at the end of interval, PGN and DPRTY are 0, no support for type 4,5,32,34,35

- SMF type 90

- SMF type 79,99
The role of CICS in Parallel sysplex

<table>
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<tr>
<td>MRO use of XCF</td>
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<td>Dynamic transaction routing enhancements</td>
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<tr>
<td>Transaction affinity program offering</td>
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<tr>
<td>Default transaction routing capability</td>
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<tr>
<td>Support for VTAM generic resources</td>
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<tr>
<td>CICSPLEX</td>
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The role of DB2 in Parallel sysplex

- Data sharing
- use of the CF
- DB2s can share
  - catalogs
  - directories
  - DASD containing DB2 objects
The role of IMS in Parallel sysplex

- N-way data sharing
- use of the CF
- IMS/TM sysplex transaction balancing
  - new IMS exit DFSNPRRT0
  - cloning IMS regions
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