Parallel Sysplex: Case Studies

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Agenda

- Sysplex Review
  - Basic
  - Parallel
  - Application Issues
- Business Issues
  - Benefits
  - Justification
  - PSLC
- Case Study 1
- Case Study 2
- Where To From Here
Sysplex Review
Basic Sysplex

**Communications**
- XCF - OS/390 base software to provide high speed communication protocol between MVS’s
- Simple API available to any authorised assembler program
- Provides Messaging services
- Provides Status Monitoring services
- Needs a physical transport .... a CTC

**Sharing**
- GRS must propagate system locks to participating MVS’s
- GRS can propagate dataset enqueues to participating MVS’s
- Can share DASD resources with integrity
- Must share selected systems datasets
Basic Sysplex ...cont

- **Time Base**
  - “Time is an illusion, lunchtime doubly so”
    - Ford Prefect (Hitchhikers Guide to the Galaxy)
  - Must have a common time reference
    - used for logging for recovery purposes
    - used as a measure of health

- **Limitations**
  - No more than 32 MVS’s in a single configuration
  - GRS propagation can cause significant performance overhead
  - Tuning of GRS required if more than 4 MVS's
  - Consider GRS STAR configuration if over 4 MVS's
Basic Sysplex
Basic Sysplex - Pre-reqs

- 2 or more processors
- 2 or more shared DASD volumes → times two
- Sysplex Timers → times two
- CTC’s providing any to any connectivity → times two
- Appropriate OS/390 Software levels
- Applications to exploit the architecture
Parallel Sysplex

- Adds to Basic Sysplex through provision of shared memory
- S3 - Shared Standalone Storage
- Allows true data sharing between MVS's as if it was processor memory
- Delivered via the Coupling Facility:
  - A Stand Alone Coupling Facility, or
  - Internal Coupling Facility
    - an engine on a CMOS processor
- XES - Base OS/390 software
  - provides all communication with Coupling Facility
  - Simple API available to authorised assembler program
Parallel Sysplex

MVS1
GRS
XCF
XES

MVS2
GRS
XCF
XES

MVS3
GRS
XCF
XES

DASD
Parallel Sysplex - Pre-reqs

- Basic Sysplex
- Coupling Facility
  - times two
  - sufficient storage and Mips to do the job
  - Scalable
- Coupling Links
  - times two
  - Currently 100 Mps, 250 Mps or 1000 Mps
  - need sufficient bandwidth
- Appropriate OS/390 Software levels
- Applications to exploit the architecture
Supported Applications

- **XCF**
  - MCS
  - GRS
  - RTM
  - APPC
  - JES2
  - JES3
  - DAE
  - VLF
  - SMS (PDSEs)
  - TSO/E
  - OPC (Tivoli)
  - WLM
  - CI CS & CTS
  - etc

- **XES**
  - RACF
  - JES2
  - JES3
  - GRS
  - DB2
  - IMS
  - DFP (Tapes)
  - CTS
  - VSAM
  - VTAM
  - etc
Warning

- Application design is critical
- Choice of Application Enablers is critical
- Which CF holds which structures?
- Co-location of CF with Application Enabler is essential to obtain best access speeds

- Ensure Coupling Link bandwidth is sufficient
- H/W design requires duplicity of critical components

- Investment in operational infrastructure is essential
Business Issues
Business - Benefits

Parallel Sysplex benefits when fully implemented

→ Rapid response to unexpected growth
  • Quickly add power to match requirements without disrupting business

→ S/390 Resource Sharing
  • Value today in a single CEC and multiple CEC environments

→ Balance multiple workloads
  • Let all applications share system resources in order to meet business goals you define

→ Increased productivity
  • Manage multiple systems as single system from single point of control

→ Continuous application availability
  • Leading-edge application availability

→ Investment protection
  • Build on current investments in hardware, software, applications and skills, all at a reduced cost of computing
Business Justification (1)

- Need a reason to implement
- Requires acquisition of hardware
- Requires investment in operational infrastructure
- Requires investment in application design

- So why do it?
Business Justification (2)

Two compelling reasons for Parallel Sysplex

1) Save money (Expediency)
   → Parallel Sysplex Licence Charging (PSLC)
   → SHAMPlex
   → S/ W TCO reduction
      ● Probably needs aggressive Asset Management

2) Availability
   → 99.999% availability is possible
   → Evaluate availability requirements
   → Does loss of service means loss of revenue?
PSLC requirements

- PSLC allows customers to qualify for significant reduction in OS/390 licence charges

- To qualify the customer must have:
  - Functional Parallel Sysplex
  - 50% of ‘production workload in said Plex
  - 50% of Mippage in said Plex
  - Plex must be exploiting the Coupling Facility
  - Valid exploiters range from full DB2 data sharing to the sharing of a single Tape Drive
Availability Definitions

- **High Availability**
  - Provide access to applications during planned outages
  - Achieved through use of redundant components and thorough testing

- **Continuous Operation**
  - Provide ‘service’ at all times - no outages
  - No change activity is possible

- **Continuous Availability**
  - Blend of the two
  - Continuous access to applications, no outages
Case Study 1
Case Study 1 - Background

- Insurance and Financial sector
- Historical configuration of two processors due to acquisition
- Not a shared or integrated workload
- Needed Mippage for Y2K development
- Lip service only to high availability
- Software costs growing rapidly
- Feasibility study to verify costs of Parallel Sysplex implementation versus PSLC savings
- SHAMPIlex an obvious choice
### Case Study 1 - Business Case

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVS S/W costs p.a (IBM only)</td>
<td>600 groats *</td>
</tr>
<tr>
<td>H/W (CF, Clinks, CTC’s, Dasd)</td>
<td>200</td>
</tr>
<tr>
<td>Internal Resources</td>
<td>35</td>
</tr>
<tr>
<td>External Resources</td>
<td>7</td>
</tr>
<tr>
<td>P.U.</td>
<td>8</td>
</tr>
</tbody>
</table>

| Year 1 PSLC Savings            | 50      |
| Future Year PSLC Savings       | 250     |

* NB: not real currency values, but in proportion
Case Study 1 - Implementation

- Acquired small CMOS processor, two second hand
  Timers, CTC’s
- Already at appropriate OS/390 level
- Parallel Sysplex covered:
  - 2 Production images
  - 1 Coupling Facility
  - 2 Development images
  - 3 Y2K development images (not time sensitive)
- Included Y2K and Development MVS’s to qualify
  on 50% rules
- Sharing most Cartridge Drives
- Minimal operational changes by design
Case Study 1 - Summary

No Sysplex side benefits:
- Console consolidation
- Shared Spool
- Data sharing
- ISV Software savings
- etc

Just overheads:
- Increased operational complexity
- Slight performance overhead of XES, XCF, GRS
- Technical Staff frustration
Case Study 2
Case Study 2 - Background

- Large European Airline
- Large Mippage required for DB2 based reservation system
- Size due to growth
- Aging (creaking) Bipolar processors, not owed anything
- Replacement CMOS processors could satisfy most of the Mippage
- Availability crucial from business perspective
- Application design modern
- Full DB2 data sharing Parallel Sysplex an obvious choice
Case Study 2 - Business Case

- Simple!

- Loss of reservation system meant loss of income immediately

- Long term loss of reservation system meant loss of organisations viability after ‘n’ hours!

- Processors due to be replaced imminently
Case Study 2 - Implementation (1)

- Acquired three CMOS processor
  - Sufficient Storage for large DB2 Caches
  - Engines specifically for Internal CF usage
  - Highly available hardware
- Acquired High Bandwidth CLinks, CTC's and Timers
- Already at appropriate OS/390 level
- Parallel Sysplex covered:
  - 3 Production images
  - 3 Coupling Facilities
Case Study 2 - Implementation (2)

- Single system image of the processing capacity
  - JES MAS
  - Sysplex operational console approach
  - Shared RACF
  - Fully shared DASD
  - etc

- Migrated existing DB2 Applications to new platform

- Other applications followed

- Location of CF’s to DB2’s is critical from performance perspective

- Care taken to minimise Inter System Read/Write Interest
Case Study 2 - Summary

- Implementation costs balanced against delivery of highly available system
- Significant Operational benefits
- Performance costs insignificant - due to design
- Will acquire higher bandwidth CLinks as they become available
- Achieving significant reduction in ISV software costs by licensing only for capacity required
Where To From Here?
Operational Infrastructure (1)

- **Capacity management**
  - Monitor CF and CLink usage
  - Understand growth requirements and consumptive spikes.

- **Change management.**
  - Some Sysplex changes are introduced across all images
  - Understand when this is required and avoid where possible
  - Dynamic Reconfiguration should be used in every case.

- **Problem management.**
  - Some problems on one MVS can affect the viability of all MVS’s, from a Sysplex health perspective
  - Ensure CF dumps are trapped, and saved
Operational Infrastructure (2)

- **Availability management**
  - Ensure configuration allows for n+1 redundancy in all component parts
  - Ensure (through trial/drift) that the important MVS’s can sustain loss of Sysplex components

- **Audit and controls**
  - Naming conventions used for ‘things’ in the Sysplex must be documented and understood

- **Operations Management**
  - Many Sysplex failures are self correcting
  - They do produce ‘frightening’ messages
  - Operational Drills are essential
Summary

- Continue with TCO reductions
- Geographically Dispersed Parallel Sysplex
  → Use PPRC to mirror DASD across sites
  → Cross Locate CF’s
  → Watch distances, performance implications
- Requires highly available applications
- Requires investment
- Practice failure
- 99.999 is a reality if desirable
- Is 99.999 really desirable?
Questions

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