Message Oriented Middlewares (MOMs)

V. Baggioolini, M. Vanden Eynden

- MOM Concepts & Applications
  - Microsoft MSMQ®
  - Talarian SmartSockets® (old RTWorks)
  - SoftWired iBus®
  - Summary
MOM Concepts & Applications

- A MOM is a Middleware that facilitates:
  - asynchronous,
  - point to multipoint,
  - non-blocking communications

- Examples: IBM MQSeries, Microsoft MSMQ, Talarian SmartSockets, iBus, ...
MOM Concepts & Applications

- Processes loosely coupled in time and location
- Applications send (Push) data asynchronously and move on to other work without waiting to connect to receiving applications.
- Data must not be lost, reordered or duplicated

Loose Coupling
Push Technology
Reliability

Internet-Style Networking
MOM Concepts & Applications

- A service through which Applications can “publish” and “subscribe” to subjects
MOM Concepts & Applications

◆ Typical Applications
  ◆ For information diffusion
    ◆ Software timing distribution
    ◆ “Page-1” information
  ◆ Alarms
  ◆ Messages from operators
  ◆ Measurements from beam instrumentation
  ◆ …
◆ For information federation
  ◆ Existing ST TDS System
Message Oriented Middlewares (MOMs)

- MOM Concepts & Applications
- Microsoft MSMQ®
- Talarian SmartSockets®
- SoftWired iBus®
- Summary
Microsoft MSMQ

Key Idea

![Diagram of MSMQ architecture showing applications and message queues connected through MSMQ Manager on both Machine 1 and Machine 2.](image-url)
Microsoft MSMQ Highlights

- Included in Windows NT Edition 4.0 or higher
- “Push style” communication
- Not yet built-in publish-subscribe mechanism
Microsoft MSMQ Highlights

- **Narrow API** (ActiveX Component for Visual Basic, Excel, Visual C++, Visual J++, ...)
- **Information about queues stored in MQIS** based on Microsoft SQL Server™ 6.5
Microsoft MSMQ Highlights

- Support for transactions (and rollback) via Microsoft Transaction Server (MTS)
- Messages can be delivered and processed according to priorities
- Supports IPX and TCP/IP protocols
- Bridge possible with UNIX platforms (FalconMQ component from Level 8 Systems)
Message Oriented Middlewares (MOMs)

- MOM Concepts & Applications
- Microsoft MSMQ®
- Talarian SmartSockets®
- SoftWired iBus®
- Summary
SmartSockets - What is it?

- A rapid application development toolkit
- Enables processes to communicate quickly and reliably across platforms, through the use of messages
- Guarantees delivery of messages
- Deals with recovery after system/network problems
SmartSockets Highlights

- Interoperability between Platforms (UNIX, WindowsXX)
- High Speed Binary Message Routing
- Asynchronous Message Transfer
- Publish-Subscribe Services
  - client processes publish and subscribe to a subject (with wildcards)
  - A many-to-many virtual connection between client processes
- Multiple RTServers
  - In charge of enabling Publish-subscription services
  - Backup processes can be receiving the same message as the primary process all along, and be ready to take over instantly if the primary process fails
- Prioritized Message Queues
SmartSockets Highlights

- Flow Control
  - Buffering capability for supporting variable traffic rates
- Guaranteed Message Delivery
- Peer-to-Peer Communication is possible
- Re-usable Extensible Message Types (> 100)
- Logging and Debugging tools
- Other SmartSockets Modules
  - Rtdaq, RTie, RTarchive, RTplayback, Rthci
- Software Development Kit (SDK)
  - C/C++ API
  - Java API (classes) supporting serialization (objects in messages)
  - ActiveX support (seamless integration in Excel, …)
# SmartSockets Highlights

## Supported Platforms & Operating Systems

<table>
<thead>
<tr>
<th>Platform</th>
<th>Operating System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel</td>
<td>Windows NT</td>
</tr>
<tr>
<td>Intel</td>
<td>Windows 95</td>
</tr>
<tr>
<td>Sun SPARC</td>
<td>Solaris</td>
</tr>
<tr>
<td>Sun SPARC</td>
<td>SunOS</td>
</tr>
<tr>
<td>IBM RS/6000</td>
<td>AIX</td>
</tr>
<tr>
<td>IBM S/390</td>
<td>OS/390*</td>
</tr>
<tr>
<td>HP 9000</td>
<td>HP-UX</td>
</tr>
<tr>
<td>SGI IRIS</td>
<td>IRIX</td>
</tr>
<tr>
<td>DEC Alpha</td>
<td>Dec UNIX</td>
</tr>
<tr>
<td>DEC Alpha</td>
<td>OpenVMS</td>
</tr>
<tr>
<td>DEC VAX</td>
<td>OpenVMS</td>
</tr>
</tbody>
</table>

No support for RT UNIX (LynxOS, VxWorks, ...)

Message Oriented Middlewares
Message Oriented Middlewares (MOMs)

- MOM Concepts & Applications
- Microsoft MSMQ®
- Talarian SmartSockets®
- SoftWired iBus®
- Summary
iBus
Multicast Software Bus

Dr. Silvano Maffeis
SoftWired AG, Zürich
maffeis@softwired-inc.com
http://www.softwired-inc.com/
What is a Software Bus

- **Message-Oriented Middleware**
- Much like a Hardware Bus, but in Software
- **Diffusion**, not Store-and Forward
  - No Centralized Queues
  - Uses IP Multicast (not TCP)
Publishers and subscribers do not have to know each other!
iBus from Softwired Inc.

- Implementation of Software Bus technology
- 100% Java
- C/C++ & CORBA API
- Small memory footprint (< 240 kB Jar-File)
- Easy to use (JavaBean interface)
- Fault tolerance features
- Inherently scalable
- Modular design
iBus Protocol Stack (1)
iBus Protocol Stack (2)

◆ Minimal Stack
  ◆ Best-effort (unreliable)
  ◆ Packets < 1500 Bytes

Message Oriented Middlewares
iBus Protocol Stack (3)

Large Data
FIFO Order
Reliability

DISPATCH
FRAG
FIFO
NAK
REACH
IPMCAST

DI PATCH
RAG
FIFO
NAK
REACH
IPMCAST

ZIP
CRYPT
...
Message Oriented Middlewares (MOMs)

- What is a MOM?
- Microsoft MSMQ®
- Talarian SmartSockets®
- iBus®
- MOM Summary
MOM Summary

◆ Advantages
  ◆ Loose coupling of processes in time and location
  ◆ Inherent Push and publish/subscribe models
  ◆ High degree of scalability
  ◆ High availability and reliability

◆ Drawbacks
  ◆ No open standard nor specification (vendor specific)
  ◆ No Remote Method Invocations