Management Subsystem (MSS)
David D. Johnston

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Agenda

- Subsystem Overview
  - ECS Context
  - Driving Requirements and Key Mechanisms
  - Management Services: Functionality & COTS
- Request Tracking
- Billing and Accounting
- System Management
  - Management Framework
  - Enterprise Framework
ECS Context
Subsystem Overview

- Provides capability to manage the ECS enterprise
  - Resource management such as:
    - Commercial Hardware: network and system
    - Commercial Off-The-Shelf software (COTS)
    - ECS custom applications
  - Allocates services to system-wide and local levels
    - Fault Management
    - Site Inventory
    - Trouble Ticketing
    - Performance Management
    - Software Configuration Management
MSS Overview (cont’d)

- MSS resides primarily in the application domain, atop OSI application layer services
- Management applications (MCI) are supported by and dependent upon other MSS and CSS services
- Management Agent Services (MACI)
  - Monitor and control managed objects (Hardware, Network, Software)
  - Provide primary means of communicating status and control information between managed objects and applications
MSS Software Architecture

- Management Software (MCI) contains COTS and custom applications that manage the ECS enterprise
- Management Agent (MACI) monitors and controls managed objects
  - Composed of a master agent and deputy
  - MACI subagent handles requests from ECS custom applications
  - MACI proxy agent handles requests from COTS
- Management Logistics (MLCI) implements COTS intensive CM applications
MSS Software Architecture Overview

MLCI
- SW Distribution Management
- License Management
- Change Request Management
- Inventory/Logistics/Maintenance Management
- SW Change Management
- Baseline Management
- Policies & Procedures Management*

MACI
- Mode Management
- Fault Management
- Performance Management
- Report Generation Management
- Security Management
- Accountability Management
- Physical Configuration Management
- Trouble Ticketing
- Management Data Access
- Billing/Accounting
- Management DBMS

MCI
- Management Framework (HPOV)
- Enterprise Framework (Tivoli)
- Backup and Restore
- User Comment Survey

Management Agent Services

DSS, PLS, CLS, & other subsystems

*Policies & Procedures Management
MSS Key Drivers

- Autonomous Management Concept
- No single point of failure
- Scaleable, evolvable, configurable
- High degree of automated monitoring
- Standards based
- Common look and feel
- System-wide monitoring and coordination
- COTS intensive
Key Mechanisms

- **Distributed Object Framework (DOF)**
  - Creates remote objects and invokes remote methods
  - Provides naming, security, thread, time, and RPC services

- **Process Framework (PF)**
  - Incorporates infrastructures required to support distributed computing within ECS
  - Provides process initialization and life cycle support
  - Sets parameters for naming/directory/security services
  - Interfaces to mode management, event logging, synchronous message passing

- **Request Tracking**
  - Provides near real-time end-to-end status of selected requests (e.g., user orders, ingest, and system backups)
  - Provides access to resource cost information over the life of a request
# Management Services

<table>
<thead>
<tr>
<th>MSS Service</th>
<th>SMC</th>
<th>LSM</th>
<th>COTS</th>
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<tbody>
<tr>
<td>Common management Services</td>
<td>Enterprise framework</td>
<td>Enterprise framework</td>
<td>Tivoli</td>
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<td>Management framework</td>
<td>Management framework</td>
<td>HP-OV</td>
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<td>Mode management</td>
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<td>Peer/Optima</td>
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<td>Management Data Access</td>
<td>Management Data Access</td>
<td>SNMP</td>
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<td>Request tracking</td>
<td>ECS-wide request tracking</td>
<td>Request tracking</td>
<td>Sybase</td>
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<td>Trouble ticketing</td>
<td>Problem tracking</td>
<td>Problem reporting &amp; tracking</td>
<td>Remedy/ARS HTML</td>
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<td>User contact log</td>
<td>Track user contacts</td>
<td>Log &amp; track user contacts</td>
<td>Remedy/ARS</td>
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<td>User Comment Survey</td>
<td>User feedback</td>
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<td>Sybase HTML</td>
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<td>Report Generation</td>
<td>Analysis of roll-up reports</td>
<td>Site level service</td>
<td>Sybase SQR</td>
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<td>from sites</td>
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## Management Services (cont.)

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<td>Fault management</td>
<td>Fault Correlation Problem</td>
<td>Detection</td>
<td>HF OpenView</td>
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<td>Determination</td>
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<td>Monitor and Support</td>
<td>Recovery</td>
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<td>Performance management</td>
<td>ECS-wide trend analysis</td>
<td>Metrics Collection</td>
<td>Tivoli</td>
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<td>Performance assessment</td>
<td>Performance Analysis</td>
<td>HF OpenView</td>
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<td>Billing/Invoice</td>
<td>Site Trend Analysis</td>
<td>Peer/Optima</td>
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<td>Disseminate pricing policy</td>
<td>Site Capacity Planning</td>
<td>SNMPF Dev Kit</td>
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<td>Accounting/Billing</td>
<td>ECS-wide Oversight</td>
<td>User registration</td>
<td>SmartStream</td>
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<td>Disseminate Policy</td>
<td>Credit Tracking</td>
<td>Sybase</td>
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<td>Price Estimation</td>
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<td>Accounts Receivable</td>
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<td>Data Integrity (CSS)</td>
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<td>Intrusion Detection (CSS)</td>
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<td>DCE Cell Manager</td>
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<td>Satan (OTS)</td>
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<td>Configuration Management</td>
<td>ECS-wide configuration control and baseline</td>
<td>Site level configuration control</td>
<td>ClearCase PNM XRP II DDTS</td>
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<tr>
<td>Software Distribution</td>
<td>Distribute software to sites</td>
<td>Install software Distribute algorithms to SMC</td>
<td>Tivoli/Courier</td>
</tr>
<tr>
<td>Schedule Coordination (Reuse of PLS)</td>
<td>Coordinate ground events and inter-DAAC dependencies</td>
<td>Schedule site support resources</td>
<td>Sybase</td>
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<tr>
<td>Logistics Management</td>
<td>ECS-wide inventory</td>
<td>DAAC-level inventory</td>
<td>ILM COTS: XRP II</td>
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<tr>
<td>Inventory Management</td>
<td>ECS-wide oversight</td>
<td>Monitor/replenish spares and consumables</td>
<td>ILM COTS: XRP II</td>
</tr>
<tr>
<td>Maintenance Management</td>
<td>ECS-wide reliability trend analysis</td>
<td>Monitor, schedule, and coordinate maintenance</td>
<td>ILM COTS: XRP II</td>
</tr>
</tbody>
</table>
Order Tracking Definitions & GUI

- **Definitions**
  - **Order:**
    - made up one or more requests,
    - unique ID assigned,
    - can span multiple DAACs
  - **Request:**
    - component of an order
    - generated & fulfilled at the DAAC level,
    - unique ID assigned (i.e. R1, R2)
  - The MSS API allows:
    - subsystems to update the status of individual requests
    - track status of orders
  - Overall order status is obtained by: rolling up the individual request statuses from the tracking database
Order Tracking Operator View

Customer

Where's My Data??

User Services

I'll find out!

Order Tracking GUI

Order Tracking

Status

Not Available?

Science Data Specialist

No Errors!

i.e. PLS, DPS

Reprocessing Request

DDIST

Partially Filled Order

Distribution Tech

Archive Manager

In the Mail.

Production Planner
Order Request Tracking

User Order

CLS (S1)

EcAcOrder

MSS Request Tracking Server (S1)

EcAcRequest

DIM (S1)

SDSRV1 (S1)

SDSRV2 DAAC S2

Order Table

<table>
<thead>
<tr>
<th>Request ID</th>
<th>Order ID</th>
<th>Status</th>
<th>Ship Ad</th>
<th>etc....</th>
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</thead>
<tbody>
<tr>
<td>R1</td>
<td>O1</td>
<td>Submitted</td>
<td>xxxxx</td>
<td>xxxxx...</td>
</tr>
</tbody>
</table>

Request Table (S1)

<table>
<thead>
<tr>
<th>Request ID</th>
<th>Site ID</th>
<th>Request ID</th>
<th>Order ID</th>
<th>Status</th>
<th>etc....</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>S1</td>
<td>null</td>
<td>O1</td>
<td>submitted</td>
<td></td>
</tr>
</tbody>
</table>
Order Request Tracking (cont.)

- **DIM (S1)**
  - Request ID: R1
  - Order: O1

- **MSS Request Tracking Server (S1) - SDSRV1 (S1)**
  - Request ID: R2
  - Status: queued

- **MSS Request Tracking Server (S2)**
  - Request ID: R3

- **EcAcRequest**
  - Request ID: R1
  - Order: O1

- **EcAcRequest**
  - Request ID: R2

- **EcAcRequest**
  - Request ID: R3

- **Request Table (S2)**
  - Request ID: R3
  - Site ID: S1
  - Request ID: O1
  - Order ID: O1
  - Status: queued

- **Request Table (S1)**
  - Request ID: R1
  - Site ID: S2
  - Request ID: R1
  - Order ID: O1
  - Status: submitted

- **Parent**
  - Request ID: R2
  - Site ID: S1

- **Parent**
  - Request ID: R3
Billing and Accounting Application Service (BAAS)

- Over 80% of L4 requirements satisfied by COTS
- Distributed Accounting solution implemented via COTS, Order Management processing available at DAACs
- Accounts Receivable centralized at SMC
- Primitives developed to satisfy:
  - Available user balance
  - Standard price table lookup
  - Update available user balance as product ships
- Custom code focuses upon:
  - Collecting pricing data
  - Cost data collection and analysis
  - Supporting other subsystems
BAAS COTS: SmartStream

- Major BAAS functions are:
  - Billing and Invoicing
  - Accounts Receivable (A/R)
  - Accounts Payable (A/P)
  - Collections
  - General Ledger (G/L)
  - Reporting
User Interface/Roles

- COTS MS Windows client interface plus custom Manager UI to control BAAS, initiate Price Table updates, retrieve order information, and update accounts.
- Operator interface roles include:
  - User Services Representative
  - Billing Clerk
  - BAAS Accountant
- Access to account information follows accepted accounting principles
- Designed to ensure data integrity. Access controlled via ACLs and operator roles
Management Framework Overview

- **Components**
  - HP Openview Network Node Manager
  - Master Agent: Optima by Peer Networks
  - Custom Management Agents

- **Protocols**
  - Simple Network Management Protocol (SNMP)
  - DCE/RPCs under DOF for secure communication

- **Management for Distributed C/S Environment**
  - Network Management
  - Management of COTS and custom applications
HP Openview Network Map

Driving Reqs:
- Central control points
- Real-time monitoring
- Integration between regions
- Fault Correlation
- Mode Mgmt
  - Training
  - Test
  - Operational
  - etc...

Functions:
- Pictorial map of network
- Monitoring of network components
- Mode Mgmt Services:
  - activate
  - suspend
  - deactivate
  - resume
  - shutdown
  - etc...
- Discovery:
  - detects new components
Management Framework Functional Data Flow

- **HP-OV Event categories:**
  - Error
  - Threshold
  - Status
  - Config’tion
  - Application Alerts
  - Custom
Enterprise Framework Overview

- Enterprise Framework via TIVOLI
- Consists of Tivoli Management Platform
  - Administration
  - Sentry
  - Courier
  - Enterprise Console
  - Tool Kits
    - Install and Customize Tivoli/Plus Modules
    - Build Tivoli Event Adapters
- Management for distributed Client/Server environment
- GUI and Command line interface
Enterprise Framework with Tivoli

**Driving Reqs:**
- System Admin.
- SW Distribution
- Performance Monitoring of COTS
- Integration between regions (DAACs & SMC)
- Fault Correlation
- Scaleable
- Evolutionary: provide toolkits for custom integration

**Functions:**
- **System Admin:**
  - Sybase DB
  - DCE Admin
  - Sys Backup & Restore
- **Monitor:**
  - processes, file space, free space, etc
- **Event adapters**
  - that capture COTS events
- **Plus modules**
  - used to integrate:
    - Sybase
    - Remedy
    - Networker
    - AutoSys
Enterprise Framework
Event Monitoring

MSS SERVER

HP- Open View

TIVOLI T/EC

Deputy (COTS + Custom)

SNMP events (traps)

Set Request / Secure Event Notification (RPC)

Events

Get Requests and Responses (SNMP)

TIVOLI (SENTRY)

Master Agent (COTS)

Proxy Agent (Custom)

COTS Application

TIVOLI LOG EVENT ADAPTOR

TIVOLI EVENT ADAPTOR

Events

Get Request/ Responses (SMUX)

Events

Manager Code (Custom)

ECS Application

Events

Management Request (COTS specific API)

Events

process framework (pf) application

ECS Sub-Agent (COTS + Custom)

Events

Set Request and Responses / Secure Event Notification DOF (DCE/RPC)

Event Adapter types that send events to Tivoli:

- Custom
- HP-OV Adapter
- Log Event Adapter
MSS Summary

- MSS provides management capabilities for COTS and ECS custom software and hardware by
  - monitoring & control of HW & SW processes
  - maintain historical logs of events
  - mode management (for testing, updates)
- Order & Request Tracking: near real-time status
- Billing and Accounting: charge back capabilities
- CSCI review
  - MCI: Management COTS and custom code
  - MACI: Management Agent
  - MLCI: Mgmt Logicstics & CM functions