Tips and Tricks for Implementing the OpenEdge Application Server

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• Understanding PASOE
  • Progress Application server for OpenEdge
• Run the newest versions
• Configure PASOE for your application
• Monitoring PASOE
• Memory
• What’s new?
• Summary
Understanding PASOE

PASOE is _NOT_ the Classic AppServer
Classic AppServer
Progress Application Server for OpenEdge
GTO

- Car
- Transport people
- Uses Gas
- No Computer
- 4 Speed Transmission
- 10 miles to the gallon

Tesla

- Car
- Transport people
- Uses Electricity
- Is a Computer
- No Transmission
- 110 miles to gallon
Classic AppServer

- Runs ABL code
- Supports:
  - REST
  - WSA
  - WebSpeed
  - AppServer
  - Mobile

PASOE

- Runs ABL code
- Supports:
  - REST
  - SOAP
  - WEB
  - APSV
  - Mobile
Classic AppServer

- No Web Server
- 1 Agent = 1 ABL Session
- No Built-in Security
- Adapters for REST, WSA, AIA
- WebSpeed messenger
- AppServer protocol
- Requires AdminServer
- Load Balancing via NameServer

PASOE

- It is a Web Server!
- 1 Agent = many ABL Sessions
- Spring Security
- REST, SOAP, APSV Built-in
- WEB Transport Built-in
- New Web Handler
- Stand Alone
- Load Balancing using industry standard products
Understanding PASOE

Architecture
Architecture: Components

Classic AppServer Components

- AdminServer
- NameServer
- AppServer
- Agent
  - 1 ABL Session

PAS for OpenEdge Components

- Client
- Session Manager
- PAS for OpenEdge
  - APSV (AIA)
  - SOAP (WSA)
  - REST/Mobile
  - WebSpeed
- MSAgent
  - ABL Sessions
- AIA WSA
  - WebSpeed
  - REST/Mobile
Architecture: Sample

Classic AppServer Components

- Client
- AdminServer
- AppServer
  - 50 Agents
- NameServer
- State-Aware
- Stateless
- Stateless

PAS for OpenEdge Components

- Client
- Session Manager
- MSAgent
  - 150 ABL Sessions
- PAS for OpenEdge
  - APSV (AIA)
  - SOAP (WSA)
  - REST/Mobile
  - WebSpeed

AIA WSA
WebSpeed
REST/Mobile
Architecture: Multi-Session Agent

- Multiple client requests at the same time
- Supports both Session-Managed and Session-Free request simultaneously
- Manages database shared memory connections
- Uses much less system resources
- Handles multiple times more transactions than the single session AppServer agents
# PROMON - RDBMS Self-service Connections

User Control: by user number for all tenants

<table>
<thead>
<tr>
<th>Usr:Ten</th>
<th>Name</th>
<th>Domain</th>
<th>Type</th>
<th>Wait</th>
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PASOE at Instance Create and Run-time

$DLC/servers/pasoe

PAS for OE (template)

lib
bin
*.sh
conf

webapps
common/lib
openedge
extras

Copy & tailor
Full copy

( ROOT [ *.war ] )

$WRKDIR/oepas1

PAS for OE Instance

*.sh
conf
logs
temp
work
webapps

openedge

Copy & tailor
Full copy

OS Process

PAS for OE Process

lib
bin
*.sh
conf
logs
temp
work
webapps
common/lib
openedge

( CATALINA_HOME )

( CATALINA_BASE )

tcman create

tcman start
# PASOE Development versus Production

<table>
<thead>
<tr>
<th>PAS for OE Development</th>
<th>PAS for OE Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can compile code</td>
<td>Cannot compile code</td>
</tr>
<tr>
<td>Non-secure configuration</td>
<td>Secure configuration</td>
</tr>
<tr>
<td>Test server instance in $WRKDIR</td>
<td>No test server instances</td>
</tr>
<tr>
<td>Remote administration included</td>
<td>Remote administration optional</td>
</tr>
<tr>
<td>Tomcat/Openedge Manager Apps</td>
<td>Tomcat/OpenEdge Manager Apps</td>
</tr>
<tr>
<td>Built-in oeabl web application (ROOT)</td>
<td>Built-in oeabl web application (ROOT)</td>
</tr>
<tr>
<td>All transport deployed and enabled</td>
<td>All transports deployed but disabled</td>
</tr>
<tr>
<td>Restricted: 5 concurrent requests and 1 agent</td>
<td>Unrestricted: concurrent requests and agents</td>
</tr>
</tbody>
</table>

[https://community.progress.com/community_groups/openedge_deployment/m/documents/2869](https://community.progress.com/community_groups/openedge_deployment/m/documents/2869)
Administration: tcman.sh/.bat (pasman.sh/.bat)

**TCMAN**
For help with TCMAN:
tcman.sh/.bat help
tcman.sh/.bat help action

**PASMAN**
In $DLC/bin
Calls
$DLC/servers/pasoe/bin/tcman.sh(.bat)
pasman action –I <instance-name>

- **Server actions**
  - create
  - start
  - clean
  - feature (on/off)
  - plist
  - pasoestart

- **Manager actions**
  - deploy
  - enable
  - delete
  - stop
  - clean –A
  - env
  - config
  - undeploy web apps
  - disable web apps
Lab 1

- Using OEE
  - Start database from Resources List page
  - Start oepas1 from Resource Details page

- Using command line
  - promon database – notice PASA and PASN users
  - tcman.bat env, tcman.bat plist – for PASOE status

- Using a browser
  - Hit home page
  - Hit ~/oemanager/applications/oepas1/metrics – to see metrics
Run the newest versions
Run the newest versions

- 11.6.4 and 11.7.4
- Many new features (more on these later)
- Memory leak bugs fixed
- Soap Out (agent calls out to soap) bugs fixed
- SSL/HTTPS bugs fixed
  - OpenSSL updated
  - Other thread-safe bugs fixed
Run the newest versions

- 11.7.4 almost available
  - New request-id in log files for debugging issues
  - New queuing metrics
  - New swagger documentation for REST API
  - New ABLObject tracking REST API
- You’ll see more in the labs
Configure PASOE for your application
The defaults are always wrong!

- Don’t go into production without testing your PASOE instance under expected load and modifying the configuration!

- We have since reset the defaults to reflect best practices

- Tomcat settings
  
  - `tcman config` - will list all of the configurable values for Tomcat
  
  - `tcman config psc.as.executor.maxthreads=300` – Will set Tomcat incoming threads to 300 (the default by the way)

  - `psc.as.https.maxqueuesize=100` – thread overflow if executor maxthreads are full
The defaults are always wrong!

- **openedge.properties**
  - maxAgents=10
  - minAgents=0 0 is off, >1 maintain this number
  - numInitialAgents=1
  - agentStartLimit=1 only start one agent at a time (*prevents connection storm*)
  - maxConnectionsPerAgent=16 max concurrent connects per agent
  - maxABLSessionsPerAgent=200 max agent sessions *
The defaults are always wrong!

maxthreads=300  maxAgents=10
maxqueueSize=100  maxConnectionsPerAgent=16
Total 160

-n 100
Example configuration

maxthreads=200
maxqueuesize=100
minAgents=1
maxConnectionsPerAgent=200
Total 201

-n 201 +
paspropconv

- Available in 11.7.3
- Runs against ubroker.properties
- Creates a merge file
- Merge file describes changes and further modifications
- Use file to migrate settings to PASOE
- Migrate from Classic AppServer to PASOE Video


- Migration Guide

https://community.progress.com/community_groups/openedge_general/m/documents/3455
Test, Test, Test

- Some tips for load testing, machine sizing, performance setting

1. Don’t use the Development license for load or performance testing

2. Always run your tests with your driver on one machine, PASOE on a separate machine, and your database on a third machine

3. Start with low client load

4. What to monitor during performance testing
   a) Check round-trip time
   b) Check system resources (top - Load)
Test, Test, Test

5. What to monitor during performance testing (continued)
   a) Check PASOE process memory (java)
   b) Check MSAgent process memory (_mproapsv)
   c) Check MSAgent Session Memory (oemanager REST API, others)

6. When to upgrade machine
   a) When round-trip time starts to fall
   b) When CPU load matches CPU number
   c) When memory is exhausted (starts to swap)
Lab 2

- Fill-in new values for openedge.properties from
- A sample ubroker.properties
- A sample “asbman –query”

- Run paspropconv
- Migrate to PASOE
- View the oemerge file or the openedge.properties for comments

- How did your manual updates match paspropconv?
Monitoring your production PASOE
Monitoring your production PASOE

- JConsole
- OE Manager REST API
- Tomcat Manager
- JMX Query
- OpenEdge Explorer and OpenEdge Management
- Log files
JConsole

- GUI based tool for accessing the Tomcat and PASOE JVM directly
- Direct access to all JMX beans and objects in the Tomcat/PASOE Session Manager
OE Manager REST API

- Must be installed to the PASOE instance
  - tcman deploy $DLC/servers/pasoe/extras/oemanager.war
  - Results in: ~/webapps/oemanager
- Can now access PASOE information via HTTP/REST calls
  - http://localhost:8810/oemanager/applications/oepas1/metrics

```json
{
    "result": {
        "requests": 0,
        "writeErrors": 0,
        "reads": 0,
        "concurrentConnectedClients": 0,
        "maxQueueDepth": 0,
        "writes": 0,
        "maxConcurrentClients": 0,
        "readErrors": 0,
        "reserveConnectionTimeouts": 0,
        "timesQueued": 0,
        "avgQueueDepth": 0,
        "type": "OE_BROKER",
        "startTime": "2017-11-08T08:05:04.733-05:00",
        "accessTime": "2017-11-08T08:33:34.913-05:00"
    },
    "operation": "GET SESSION-MGR METRICS",
    "versionNo": 1,
    "versionStr": "v11.6.4 ( 2017-09-23 )",
    "errmsg": "",
    "outcome": "SUCCESS"
}
```
OE Manager REST API

- Available via HTTP/REST
- Must secure if using in Production
- Change the default passwords
  - `/conf/tomcat-users.xml`
- Limit access to the URL (Remote Address Filter)
  - `webapps/oemanager/WEB-INF/web.xml`
OE Manager REST API

- [http://localhost:8810/oemanager/applications/oepas1/metrics](http://localhost:8810/oemanager/applications/oepas1/metrics)
  - Like “asbman –query” from classic

- [http://localhost:8810/oemanager/applications/oepas1/sessions](http://localhost:8810/oemanager/applications/oepas1/sessions)
  - All current client sessions in the Session Manager

- [http://localhost:8810/oemanager/applications/oepas1/agents/22484/sessions](http://localhost:8810/oemanager/applications/oepas1/agents/22484/sessions)
  - Shows all agents ABL sessions, start and end times, Session memory

  - Shows all requests in the agent
OE Manager REST API Swagger UI

- Available in 11.7.4
  - Must enable by uncommenting SwaggerUI section in `<instance-dir>/webapps/oemanager/WEB-INF/oemgrSecurity-container.xml`

    `<!-- Access to SwaggerUI. Disabled by default, user has to uncomment the below line to enable it -->`

    `<intercept-url pattern="/doc/**" method="GET" access="hasAnyRole('ROLE_PSCAdmin','ROLE_PSCOper','ROLE_PSCUser')"/>

- To access swagger for OE Manager REST API
  - `http://hostname:port/oemanager/`
OE Manager REST API Swagger UI

Agent Manager

**DELETE**

`/applications/{appName}/agents/{agentID}/sessions/{sessionId}`  
Terminate ABL Session

**GET**

`/applications/{appName}/agents/{agentID}/ABLObjects/status`  
Status of ABLObjects tracking

**PUT**

`/applications/{appName}/agents/{agentID}/ABLObjects/status`  
Enable/Disable ABLObjects

**GET**

`/applications/{appName}/agents/{agentID}/ABLObjects`  
Get ABLObjects Report

**GET**

`/applications/{appName}/agents/{agentID}/ABLObjects/sessions/{sessionId}`  
Get ABL Objects Report per ABL Session

**GET**

`/applications/{appName}/agents/properties`  
Get MS-Agent Properties

**PUT**

`/applications/{appName}/agents/properties`  
Update MS-Agent Properties
Tomcat Manager

- Web based management and monitoring
  - Tomcat process
  - ABL and Web Applications
- Data on current requests to the web server
- Data on memory size of the web server (including the Session Manager)
- More
JMX Query

- Script based access to the Tomcat JMX beans
  - Allows gathering information locally without opening ports
  - Like JConsole, without GUI interface

- Available in 11.6.4 and 11.7.2

- `~/bin/oejmx.sh(.bat)`
  - Self documented in the script/batch file
  - Complete documentation will be released with 11.7.4
Administration: OpenEdge Explorer and Management

- **OpenEdge Explorer**
  - For full management AdminServer must be local

- **OpenEdge Management**
  - For full management AdminServer must be local
  - Can monitor and alert
  - But trending is not available yet
Lab 3

- Run test code to create requests
- View Tomcat Manager screens
- View OpenEdge Explorer screens
- View oemanager REST API responses
- Run oejmx script
- View script output file
Memory
Memory: Sample Leak

<table>
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<tr>
<th>PID</th>
<th>State</th>
<th>Port</th>
<th>nRq</th>
<th>nRcvd</th>
<th>nSent</th>
<th>Started</th>
<th>Last Change</th>
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<td>09-Apr-2018 06:18</td>
<td>12-Apr-2018 14:27</td>
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Top output

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<td>48.1 16.3 398:10.95 _proapsvs</td>
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</table>
## Memory: Sample Leak

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**Top output**

<table>
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<th>PID</th>
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<th>Memory (GB)</th>
<th>Resource usage</th>
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<tr>
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<th>Max Vm</th>
<th>Max Res</th>
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<th>CPU</th>
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Memory: MSAgent

- Memory usage will appear to be multiplied
- We use less memory in total, but its all in 1 executable
- If you classic AppServer agent routinely used 2 Gig of memory
- Moving to PASOE and setting the maxConnectionsPerAgent=100
- Results in an msagent somewhere under 200 (historically 140) Gig of memory
Memory: MSAgent

“Although PASOE is our new web application server, it is also a very good tool for exposing memory leaks!”

- Having 100 ABL sessions in a single agent (versus 1 session in Classic)
- Memory issues and leaks are multiplied by 100 times!
- This means a 100 Meg leak of 24 hours
- Is now 10 Gig over the same 24 hours in PASOE
Memory: MSAgent

- Progress has fixed some memory issues highlighted by PASOE
  - Client-Principal, SSL, Web Handler

- Tools to help you find memory leaks (new and improved)
  - New – memory-checker
    - Ability to dump memory allocation of object to a file per ABL session
    - Note: run with one agent and one session
  - Updated – Dynamic Object leakchecker.p
  - Dump a ABL session stack (like prostack) via the oemanager REST API
Memory leakchecker

- Turn on Dynamic Object logging
  - In the configuration file, openedge.properties
  - `agentLogEntryTypes=ASPlumbing,DB.Connects,DynObjects.*`
    - DynObjects.Class
    - DynObjects.DB
    - DynObjects.Other
    - DynObjects.XML
    - DynObjects.UI
Memory leakchecker

- Turn on Dynamic Object logging
  - In an sessionActivateProc

```sql
DEF NEW GLOBAL SHARED VARIABLE iactcnt AS INT NO-UNDO.
DEF NEW GLOBAL SHARED VARIABLE clogentries AS CHARACTER NO-UNDO.

iactcnt = iactcnt + 1.

IF iactcnt = 50 THEN
  DO:
    ASSIGN clogentries = log-manager:log-entry-types
    log-manager:log-entry-types = log-manager:log-entry-types + ",DYNOBJECTS.*:4".
  END.
ELSE IF iactcnt = 200 THEN
  DO:
    log-manager:log-entry-types = clogentries.
  END.
```
Memory leakchecker

- Once the information is logged to the oepas1.agent.log
- Run the new leakchecker.p
- [https://knowledgebase.progress.com/articles/Article/P133306](https://knowledgebase.progress.com/articles/Article/P133306)
- This will show any leaking objects by showing any created but not deleted dynamic objects
ABL session stack

- This will dump ABL session information for an ABL session
- If the session is using large amounts of memory
- This will dump the current ABL stack for review
- http://localhost:8810/oemanager/applications/oepas1/agents/22484/sessions/7/stacks
ABL session stack

```json
{versionNo: 1,versionStr: "v11.6.4 ( 2017-09-23 )",errmsg: "",outcome: "SUCCESS",
result: {
ABLStacks: [
AgentSessionId: 7,
StartUpParams: ":-pf C:\Progress\116\OpenEdge\startup.pf,-cpinternal ISO8859-1,-cpstream ISO8859-1,-cpcoll Basic,-cpcase Basic,-d mdy,-numsep 44,-numdec 46,(end .pf),-logginglevel 2,-logfile C:\OpenEdge\116\WRK\oepas1/logs/oepas1.agent.log,
Propath: ":,C:\OpenEdge\116\WRK\oepas1\openedge,C:\Progress\116\OpenEdge\tty,C:\Progress\116\OpenEdge\tty\ablunit.pl,C:\Progress\116\OpenEdge\tty\adecomm.pl,C:\Progress\116\OpenEdge\tty\adecomp.pl,...",
Databases: [],
PersProcs: [{Proc: "C:\Progress\116\OpenEdge\tty\webutil\_wstyle.r",ProcId: 1079},
...
OO4GLObj: [{Class: "OpenEdge/Logging/Logger.r",ObjectId: "001051"},
...],
Callstack: [],
Status: "Idle"}],
operation: "GET SESSION RUNTIME STACKS"}
ABLObject tracking REST API

- New in 11.7.3
- Allows you to turn on and off ABL Object tracking
- Check if ABL Object tracking is enabled
- Then you can retrieve the ABL Object report
- Can be run on a production machine without stopping or starting the PASOE instance
Memory: Reclaiming System Memory

- First try removing high memory Agent sessions
  - curl -v -X DELETE -u tomcat:tomcat 
    http(s)://host:port/oemanager/applications/agents/agentId/sessions/sessionId

- If that doesn’t work you can “stop” an Agent
  - You can stop agent in 11.7.2, but there is a new way to do it in 11.7.3 (next slide)

- Set minAgents=(a number 2 or greater)
  - This will restore agents to the pool when an agent is stopped (or crashes)
Memory: Reclaiming System Memory: New in 11.7.3

- New “stop”
    - waitToFinish – time to wait for all requests to complete
    - waitAfterStop – time after waitToFinish before terminating agent
- Manually “start” a new agent
  - POST //host_name:port/oemanager/applications/App_name/addAgent
- https://documentation.progress.com/output/oe117sp/index.html
Memory: Reclaiming System Memory

- Surprise!
- oom_kill
  - Unix systems
  - Kills the largest memory using process when memory threatened
  - MSAgent was being killed!
- This also has caused a connection storm to databases
  - agentStartLimit=1 added to stop connection storm
Memory: Resource Timeout

agentListenerTimeout=300000
agentWatchdogTimeout=3000
connectionWaitTimeout=3000
idleAgentTimeout=300000
idleConnectionTimeout=300000
idleResourceTimeout=0
idleSessionTimeout=300000
requestWaitTimeout=15000
socketTimeout=3000
sessionTimeout=180

These values are milliseconds

If running with a “backup” agent may want to disable this value (0)

Must be set to >0 to enable, NO timeouts enabled when set to 0
Memory: Tomcat

- OpenClient connections
  - Be sure to release and dispose of OpenClient connections
  - Previously dotNet and JAVA connect to the UBroker
    - UBroker would clean up abandoned connections
  - dotNet and JAVA now connecting to the PASOE web server
    - Web server leaves the connections open for another request
  - We have seen tomcat thread leaks because OpenClients are not closing their connections
  - [https://knowledgebase.progress.com/articles/Article/NET-Open-Client-disconnect-messages-not-received-by-PASOE](https://knowledgebase.progress.com/articles/Article/NET-Open-Client-disconnect-messages-not-received-by-PASOE)
What’s new in 11.7.4

- Request ID tracking in log files
  - A request ID will be added to each log file
  - A single request can now be followed through each step of the PASOE process
- Spring User ID logging
  - Login name can now be tracked in localhost_access_log
- Queuing Metrics updated
- Swagger for REST API
Lab 4

- Using the oemanager REST API
  - Enable ABL Objects tracking
  - Verify ABL Objects tracking enabled
- Run “leaky code”
- Using the oemanager REST API
  - Get the ABL Objects Report

- Start a new agent with REST API
- Stop an agent with REST API
- Verify only the new agent is running
Summary

• Make the time to understand PASOE
• Stay up-to-date with the newest version
• Test and properly configure PASOE
• Test and look for memory issues
• Set up monitoring for PASOE