Consultingwerk
software architecture and development

Understanding PASOE Progress Application Server for OpenEdge

Mike Fechner

Mike Fechner

- Director, Lead Modernization Architect and Product Manager, Architect of the SmartComponent Library and WinKit
- Specialized on object-oriented design, software architecture, desktop user interfaces and web technologies
- 35 years of Progress experience (V5 … OE12)
- Active member of the OpenEdge community
- Frequent speaker at OpenEdge related conferences around the world

Consultingwerk Application Modernization Solutions

Progress Partner
PREMIER SERVICE DELIVERY
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- Independent IT consulting organization
- Focusing on **OpenEdge** and **related technology**
- Located in Cologne, Germany, subsidiaries in UK, USA and Romania
- Customers in Europe, North America, Australia and South Africa
- Vendor of developer tools and consulting services
- Specialized in GUI for .NET, Angular, OO, Software Architecture, Application Integration
- Experts in OpenEdge Application Modernization

SmartComponent Library

- The tool to improve **developer productivity**
- Full stack **modernization framework** for OpenEdge – focusing on strong architectural foundation
- Backend as **future-proof** home for business logic
- Relational and **object-relational** (ORM)
- **RESTful** out of the box
- Multiple **user interface options**: Desktop, Web and Mobile
- **Application Framework**: Authentication, Localization, Menu, Workflows, …
- **Integration** with existing OpenEdge applications and frameworks

An urgent reminder!

- OpenEdge 11.7 has retired **9 days** ago!
- Windows 10 will retire October 25th 2025
- Windows 12 expected around that time
- No security fixes for OpenEdge 11.7 after April 1st
- No bug fixes for OpenEdge 11.7 after April 1st
- No new platform certification after April 1st
- No formal Windows 12 support for OpenEdge 11.7
- …

Progress Application Server for OpenEdge

OpenEdge Application Server use-cases

- Since OpenEdge 8.3: **distribution of load** from (GUI client-server clients)
  - Execution of Business Logic closer to the Database
  - Improve latency of Database requests
  - Asynchronous requests from client (OpenEdge 10)
- Backend for **web applications**, WebSpeed
- OpenClient to support **alternative UI technologies** as clients
  - Visual Basic / Active X
  - Java
  - .NET

OpenEdge Application Server use-cases

- Application **integration** via SOAP Web Services
- Backend for **web and mobile Applications** via REST Adapter (OpenEdge 11.2)
- Application integration via REST/RESTful Web Services (OpenEdge 11.2)

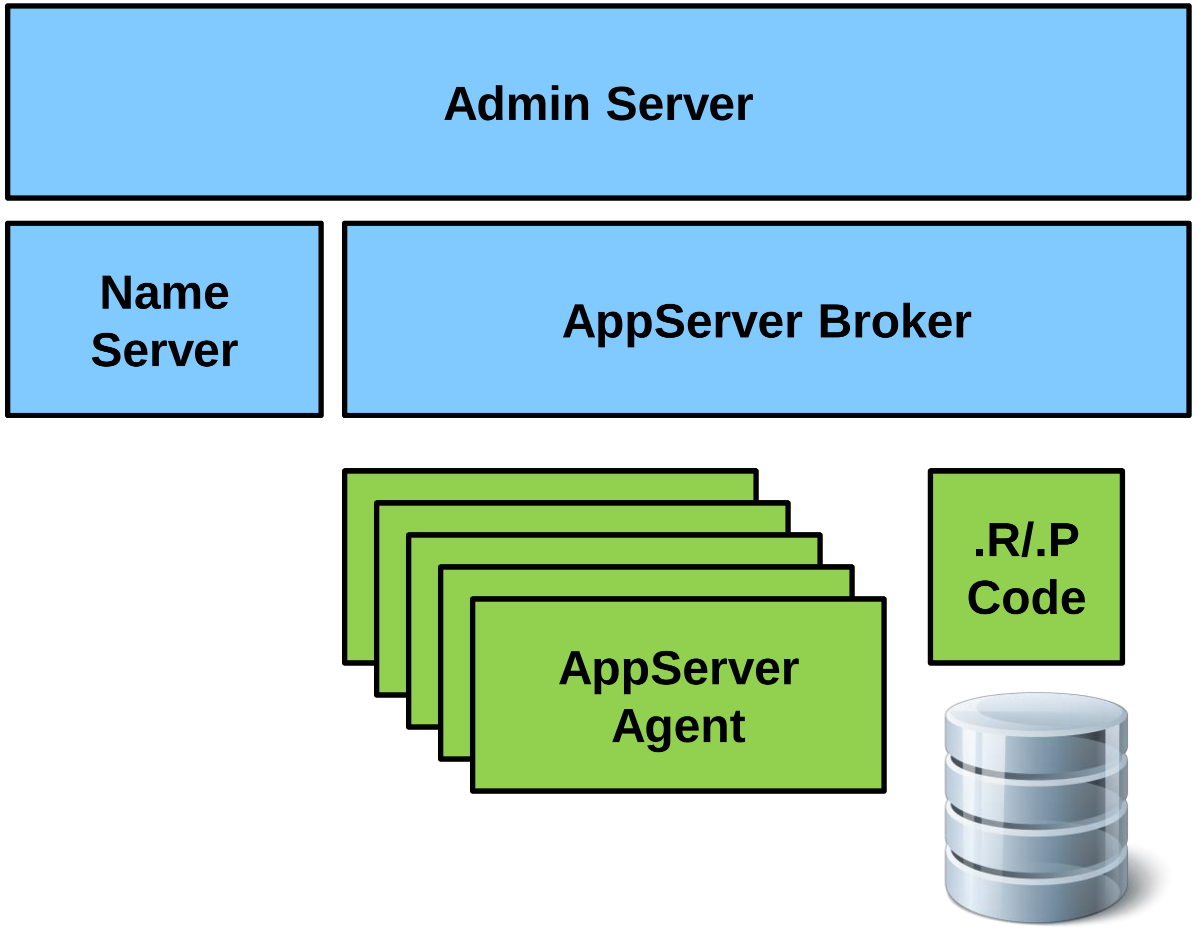
PASOE

- Progress Application Server for OpenEdge
- PASOE is the *new* AppServer for OpenEdge
- Introduced in OpenEdge 11.5 with APSV, REST and SOAP transport
- WEB transport added in OpenEdge 11.6
- Enhanced in OpenEdge 11.7
- Starting OpenEdge 12.0 the *only* AppServer for OpenEdge as the classic AppServer is retired

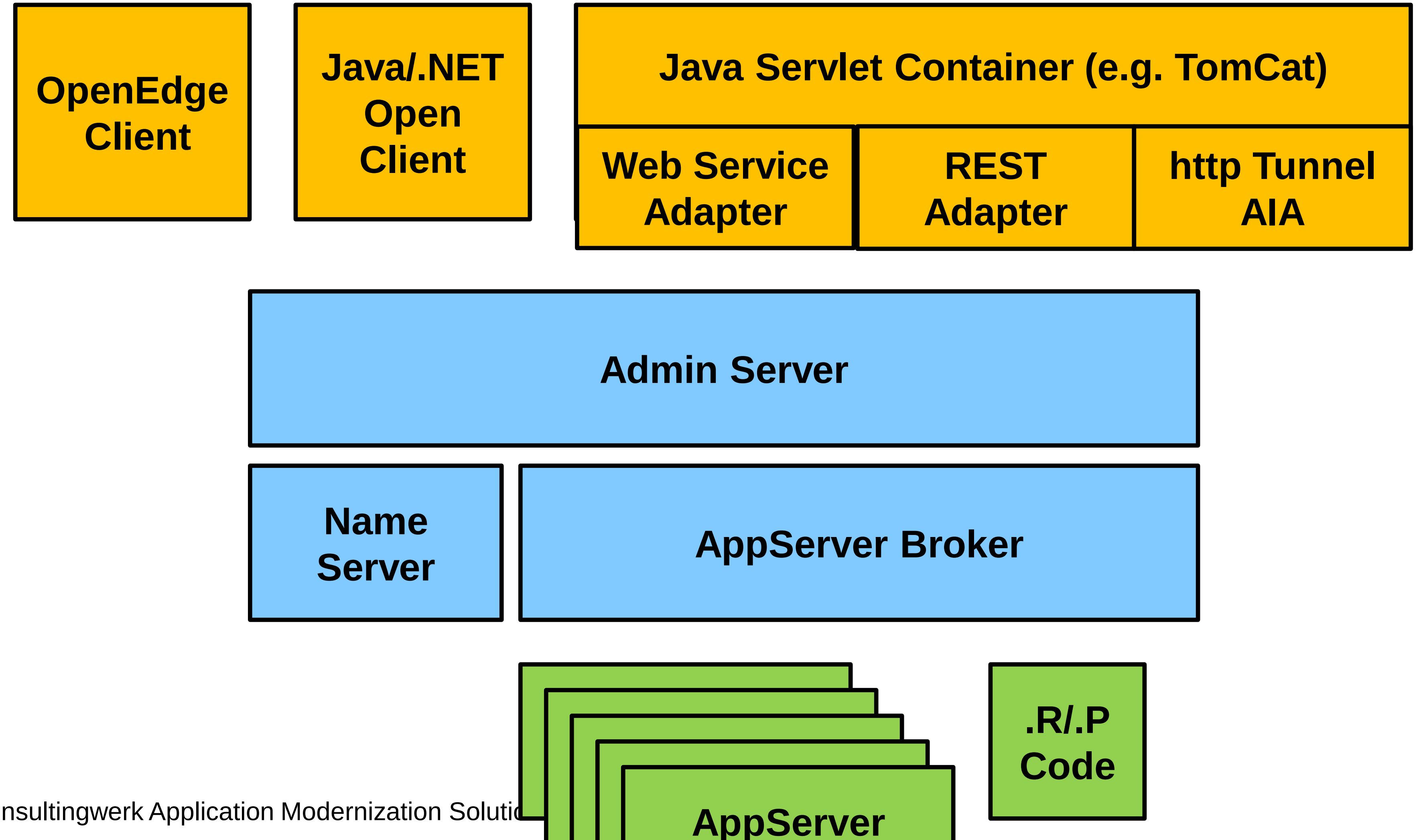
PASOE

- **64 bit only** for AppServer
- 32/64 bit for Clients (e.g. ABL GUI)
- Supported Docker images for development and production
- Build on top of Apache Tomcat – also to leverage wide set of authentication and authorization options from the Tomcat ecosystem
- No specific built-in load-balancing or fail-over solution
- **No dependency on Admin-Server framework or OpenEdge management at all**
- **Name Server no longer existing**

Classic AppServer Architecture



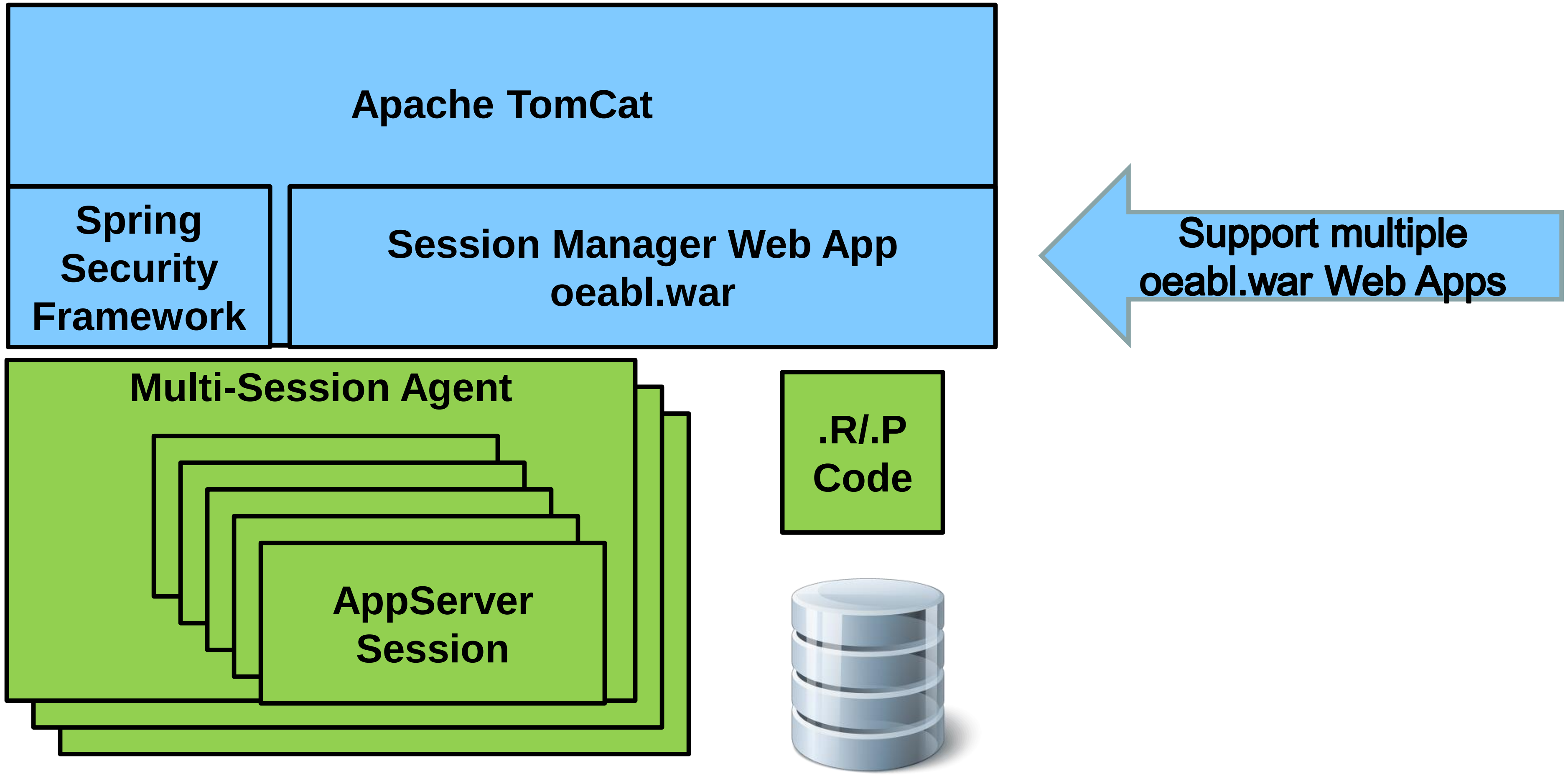
Classic AppServer Architecture



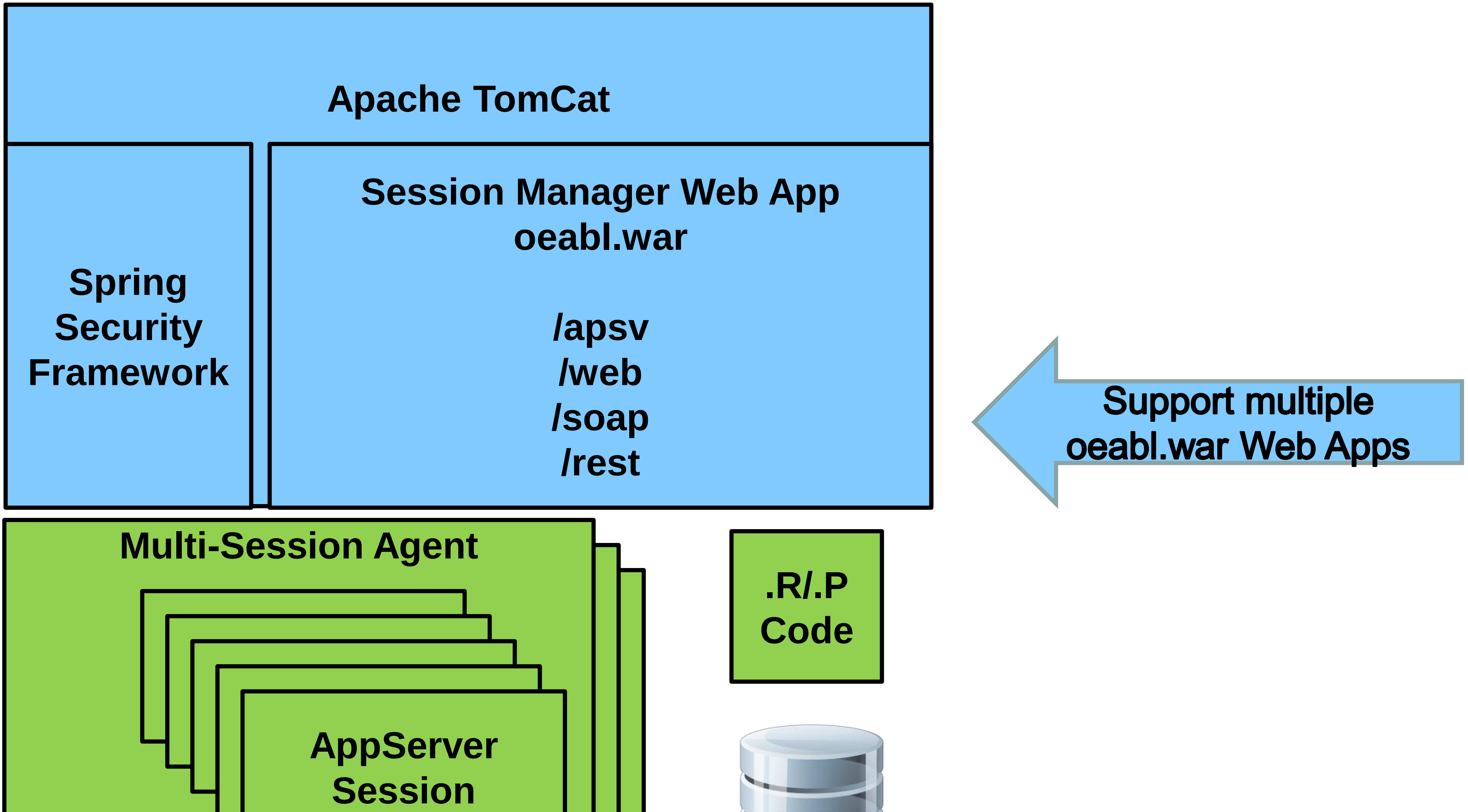
PASOE in contrast

- AppServer Broker replaced with Session Manager Tomcat webapp
- AppServer agent (C++) now supports multi-session/multiple threads
- Agent capable of executing multiple requests at a time – in parallel threads
- Agent capable of maintaining multiple sessions at a time (default configuration is 200 sessions per agent)
- To scale up (execute more concurrent requests) choice of using more agent processes or threads within the agents' processes
- Scaling more lightweight

PASOE Architecture


Apache TomCat
Spring Security Framework
Session Manager Web App oeabl.war
Support multiple oeabl.war Web Apps
Multi-Session Agent
AppServer Session
.R/.P Code

PASOE Architecture



Apache TomCat

Spring
Security
Framework

Session Manager Web App
oeabl.war

/apsv
/web
/soap
/rest

Support multiple
oeabl.war Web Apps

Multi-Session Agent

AppServer
Session

.R/.P
Code

„Session“

- ABL Session
  - The memory space allocated for an ABL runtime environment
  - All the programs (R-Code and Data allocated by that runtime)
  - -Bt and other memory related startup parameters per Session
  - Isolated from each other
  - Initial Sessions numbered 4, 7, 8, 9, 10, …
  - ABL Sessions are executed by Threads within MS-Agent
  - PASOE supports multiple MS-Agents
  - PASOE can be configured to use 1 Session per MS-Agent only, or 100’s

- Confusing term with Login Session, Session Management, etc.

PASOE – 3 license options

- **Production PASOE**
- **Development PASOE**
- **PASOE lite**
- Differences in scalability
- Production PASOE secure out of the box (all endpoints locked down)
- Development PASOE open out of the box (developer friendly)
- PASOE lite for “occasional users”, limited to 5 ABL sessions, one ABL application per PASOE instance

Java Version Dependency

- OpenEdge Installer requires JDK installed before OpenEdge install
- OpenEdge Installer asks for *“minimum”* Java version
- OpenEdge 12.2: Java 11
- OpenEdge 12.8: Java 17
- Recommended to stick with the latest patch level in that Java version
- OpenEdge 12.2 works with Java 13, but crashes with Java 17 …

Home vs. Base (Instance)

- CATALINA_HOME: %dlc%\servers\pasoe
- CATALINA_HOME contains binaries – and should not be used as an AppServer
- CATALINA_BASE: an instance – contains specific configuration for an application, may contain application R-Code
- Instance can be copied to another PC by copying the instance folder
- %DLC%\servers\pasoe\bin\tcman to „create“ a new instance
- %CATALINA_BASE%\bin\tcman to manage the instance
  - start / stop / configure
  - deploy web applications

PASMAN vs. TCMAN

- TCMAN is the Tomcat management script, to create, start, stop, … an PASOE instance
- TCMAN is **used from %DLC%**servers\pasoe\bin to create PASOE instance
- TCMAN is **used from within the PASOE instance** to start, stop, manage an PASOE instance (e.g. deploy web applications)

- https://www.progress.com/docs/default-source/default-document-library/pasoe_tcman_reference.pdf

PASMAN vs. TCMAN

- PASMAN is a wrapper to TCMAN
- Within *proenv* in System PATH
- Requires –I parameter for instance options
- https://docs.progress.com/bundle/pas-for-openedge-management-122/page/PASMAN.html

Instance list

- %DLC%\servers\pasoe\conf\instances.windows
- $DLC/servers/pasoe/conf/instances.unix

- Contains instance folders and instance logical names
- Duplicates not allowed
- Remove entries in case you have deleted a PASOE instance folder

Classic AppServer recap

- AppServer Broker (Java) manages pool of AppServer agents
- AppServer agent (C++) more or less like a Progress TTY client
  - Early versions of the AppServer agent could be launched directly; resulting in a TTY like session with a broken PROTERMCAP
- Agent capable of executing a single request at a time
- Agent contained a single session at a time
- To scale up (execute more concurrent requests) new Agent processes required to be started

Demo

- Create PASOE AppServer using TCMAN
- Start/Stop PASOE using TCMAN
- Register/Unregister as a Windows Service
- Review configuration files
- Connect from ABL client
- PASOE logfiles

Review openedge.properties

- [AppServer.SessMgr]
- [AppServer.Agent]
- [AppServer.Agent.<abl app name>]
- [AppServer.SessMgr.<abl app name>]
- [<abl app name>.<web app name>.<transport>] sections
- ABL Configuration
- PROPATH
- Startup Parameters
- Agent-Procedures

Review openedge.properties

- First ABL app is named like the PASOE instance
- Additional ABL apps are named differently
- conf/openedge.properties.README with detailed description of settings

PASOE Transports

- /apsv
  - Classic AppServer Protocol for OpenEdge and OpenClient based clients
  - Basically AIA http tunnel built into AppServer
  - No support for proprietary TCP/IP and UDP based connections
- /soap – Web Service Adapter of classic AppServer built in
- /rest – REST Adapter of classic AppServer built in
  - GET & POST, JSON payload
- /web
  - Replacement for WebSpeed
  - Foundation for more flexible (REST and SOAP) Web Services
  - **The best thing since sliced bread**

Requirements for modern web apps

- Full page requests are the exception today
- JavaScript typically executed in the browser, single-page-applications
- Web controls like Kendo UI can perform Data Binding within the browser
- Data and page layout elements are retrieved in separate web requests
- Data retrieved through backend service calls
- Web frontend may perform multiple backend requests in parallel

APSV Transport

- Transport for ABL Clients, Java or .NET OpenClients
- -URL http://<server>:<port>/apsv
- -URL http://<server>:<port>/<abl application>/apsv

WEB Transport

- Replacement for classic WebSpeed
- Designed to use ABL to build API’s

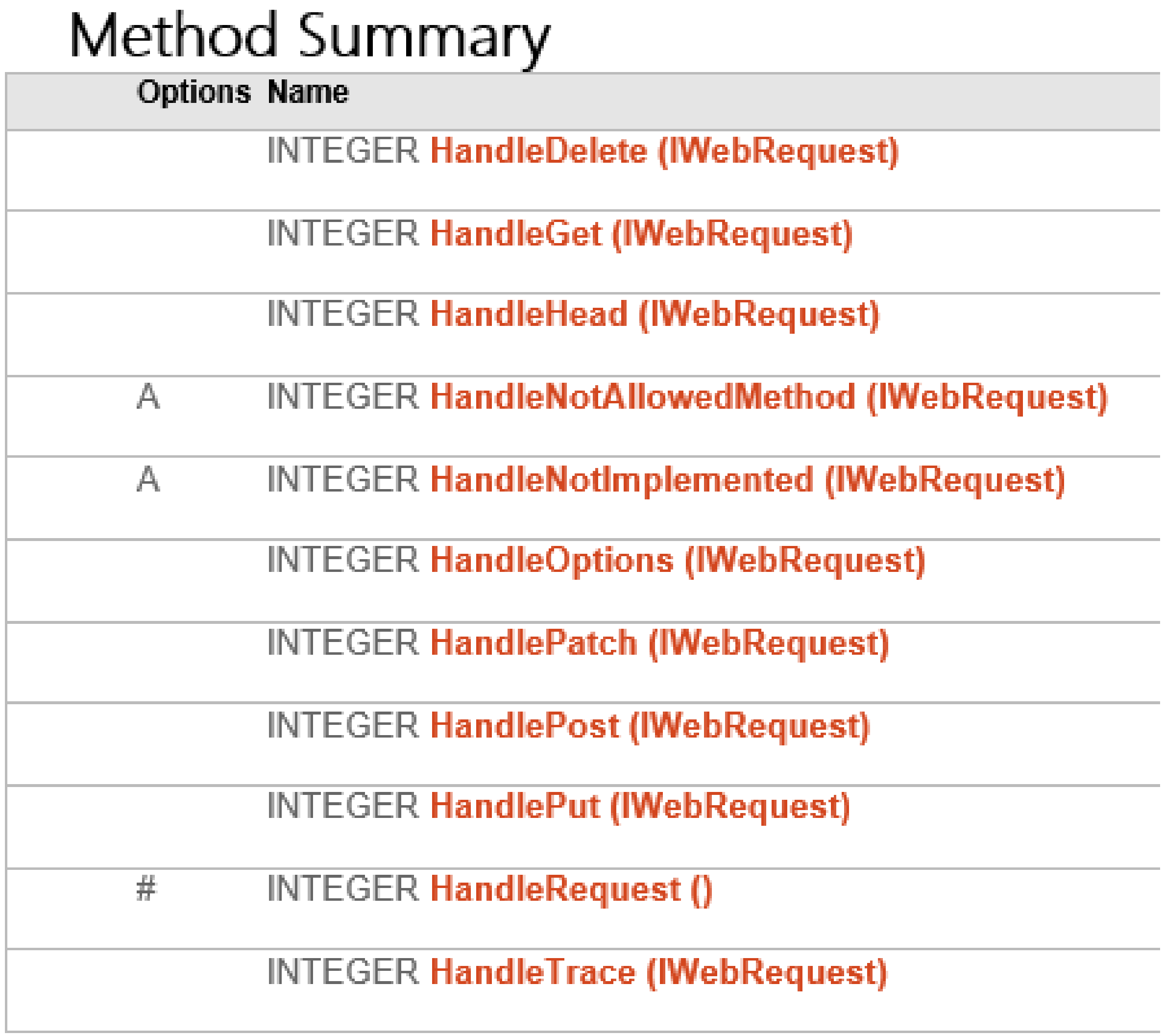
Compatibility Web Handler

- Optional feature – depending on Web transport configuration
- Supports classic WebSpeed embedded SpeedScript and CGI Wrapper
- Typically, without or only little modification
- Support for mapped web objects limited, introduced in OpenEdge 12.8
    - Not available in OpenEdge 12.2
    - Execution of existing mapped web objects
    - Not able to rebuild .off files

Web Handler

- Web Handlers provide a very flexible way to handle web requests
- Synchronous request-response pattern
- Supports html page generation
- Supports service requests as well
- Flexible enough to provide an alternative to the REST Adapter and Web Services Adapter (SOAP)
- ABL classes, extending OpenEdge.Web.WebHandler

OpenEdge.Web.WebHandler



Method Summary

Options	Name
	INTEGER HandleDelete (IWebRequest)
	INTEGER HandleGet (IWebRequest)
	INTEGER HandleHead (IWebRequest)
A	INTEGER HandleNotAllowedMethod (IWebRequest)
A	INTEGER HandleNotImplemented (IWebRequest)
	INTEGER HandleOptions (IWebRequest)
	INTEGER HandlePatch (IWebRequest)
	INTEGER HandlePost (IWebRequest)
	INTEGER HandlePut (IWebRequest)
#	INTEGER HandleRequest ()
	INTEGER HandleTrace (IWebRequest)

Web Handler

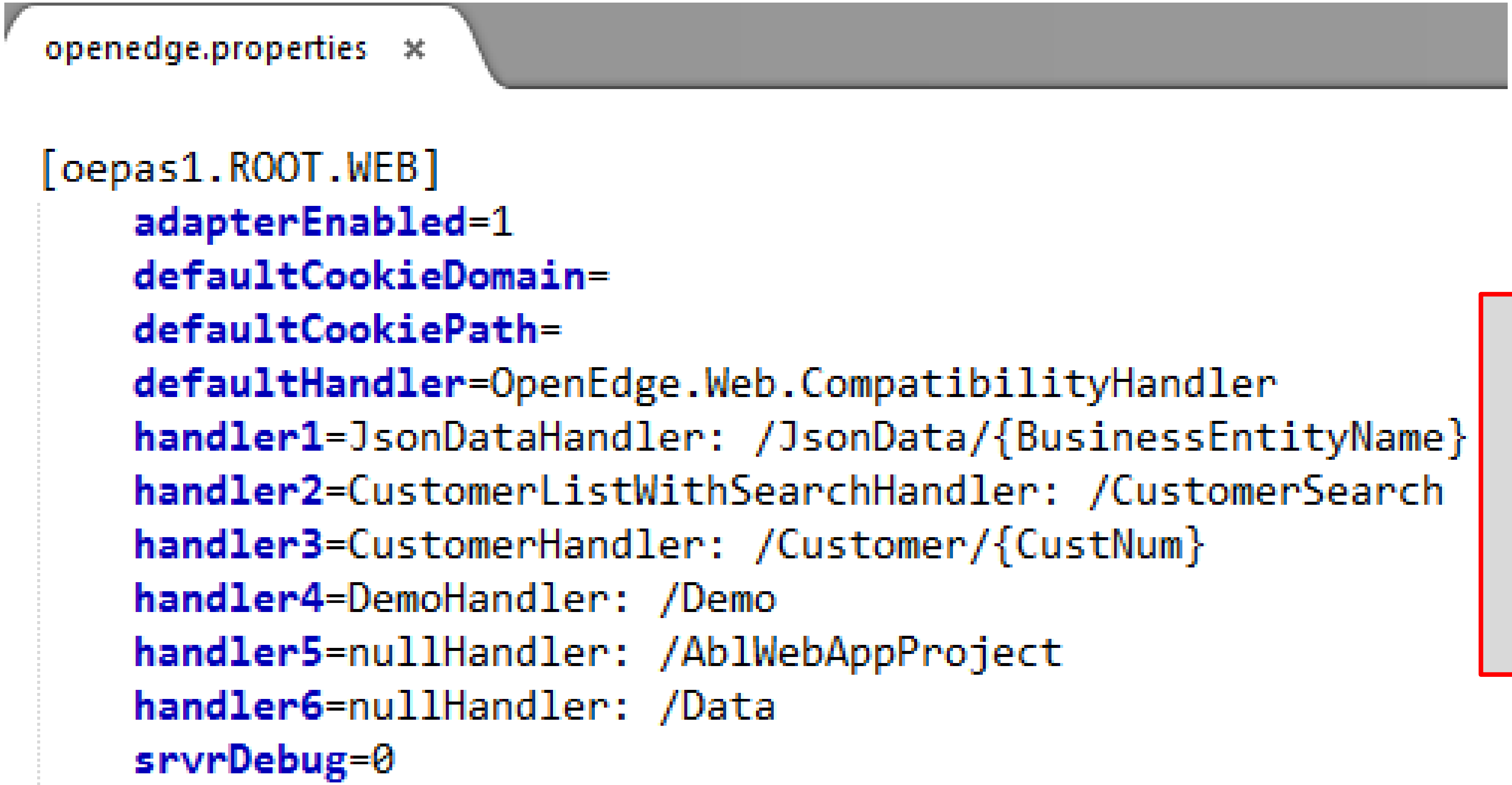
- WebSpeed in PASOE provides request handler mapping out of the box (classic Web Speed required customization of web-disp.p for this)
- Based on configuration in openedge.properties
- New PDSOE project type ABL Web Application creates and registers a single handler
- Additional handlers can be set up in OpenEdge Management or configuration files

URL Mapping

- Configuration based
- Tomcat parses request URI for patterns
- http://localhost/web/Customer/1
- More „rest-style“ URI‘s
- Higher priority in search engines compared to http://localhost/cgi-bin/cgiip.exe/Customer.w?CustNum=1

- Web handler are specialized ABL classes

URL Mapping – in conf/openedge.properties



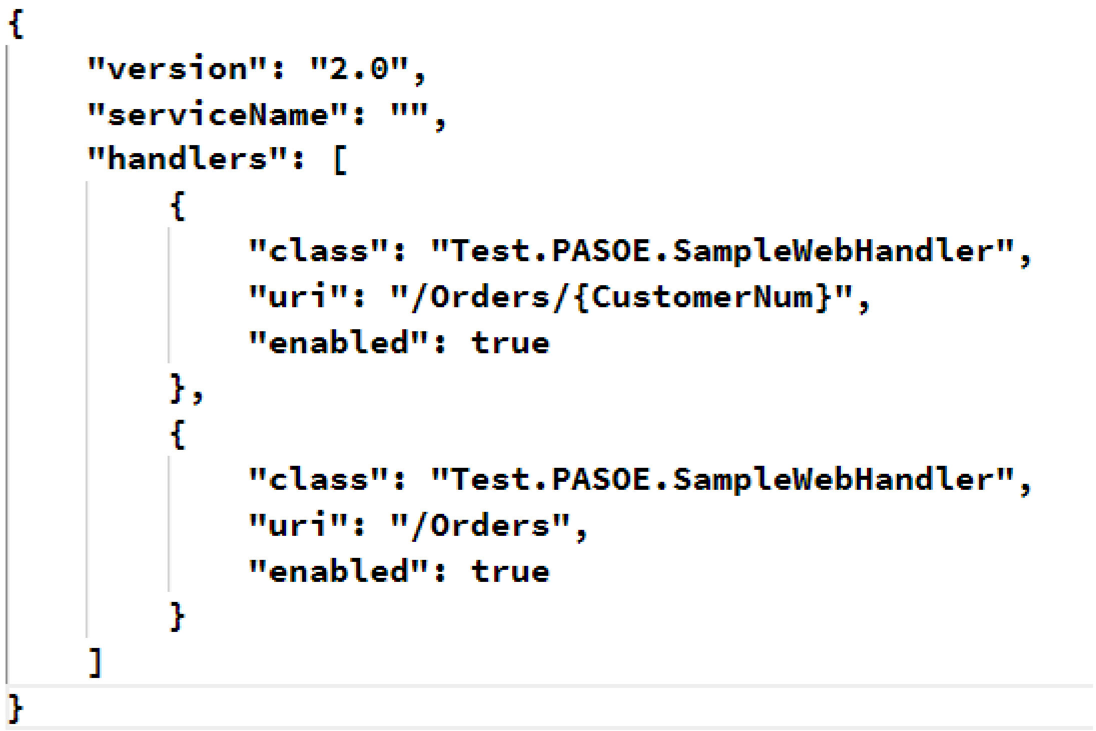
openedge.properties ×

```
[oepas1.ROOT.WEB]
    adapterEnabled=1
    defaultCookieDomain=
    defaultCookiePath=
    defaultHandler=OpenEdge.Web.CompatibilityHandler
    handler1=JsonDataHandler: /JsonData/{BusinessEntityName}
    handler2=CustomerListWithSearchHandler: /CustomerSearch
    handler3=CustomerHandler: /Customer/{CustNum}
    handler4=DemoHandler: /Demo
    handler5=nullHandler: /AblWebAppProject
    handler6=nullHandler: /Data
    srvrDebug=0
```

Not gaps or duplicates allowed in handler list!!!

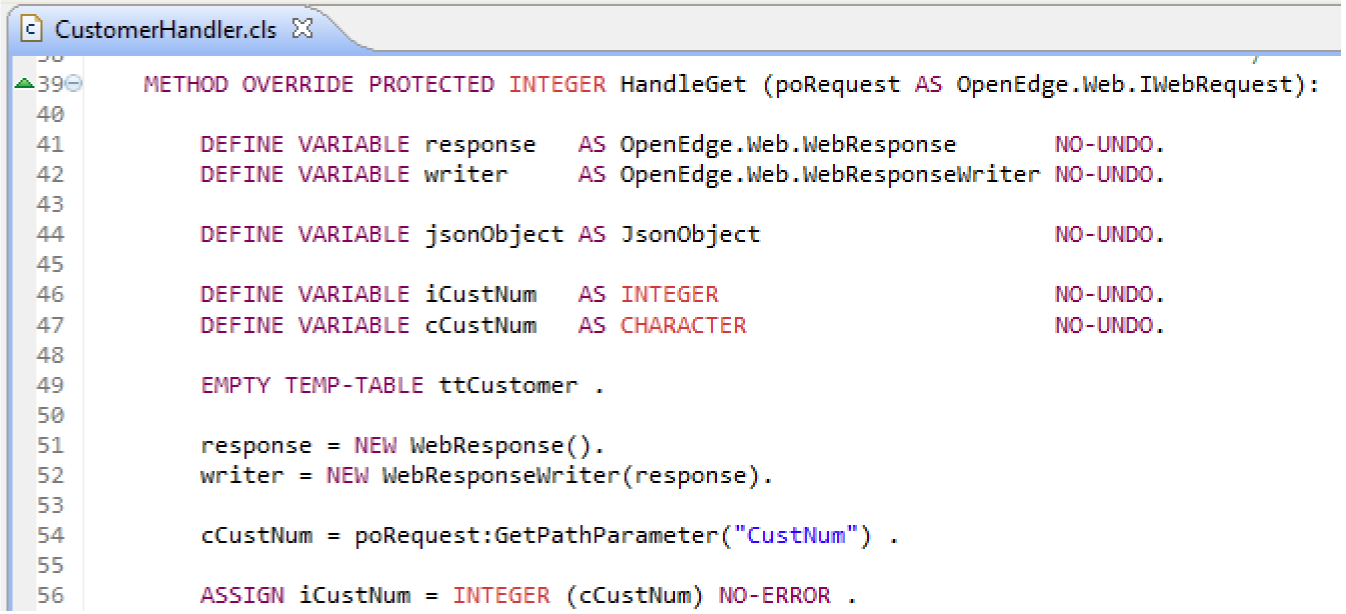
URL Mapping in .handlers file

- JSON file in /webapps/ROOT/WEB-INF/adapters/web/ROOT/ROOT.handlers

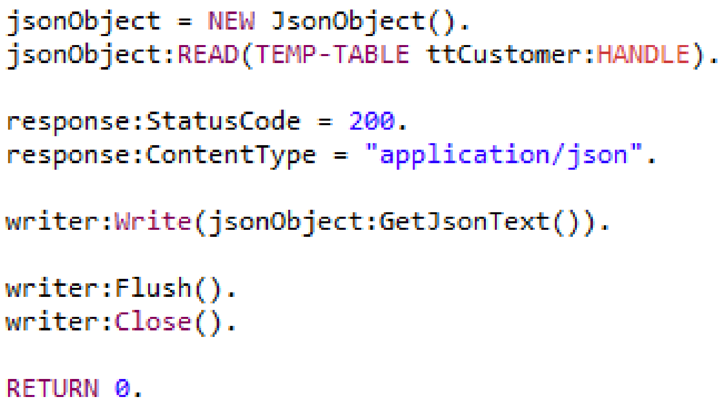


```
{
    "version": "2.0",
    "serviceName": "",
    "handlers": [
        {
            "class": "Test.PASOE.SampleWebHandler",
            "uri": "/Orders/{CustomerNum}",
            "enabled": true
        },
        {
            "class": "Test.PASOE.SampleWebHandler",
            "uri": "/Orders",
            "enabled": true
        }
    ]
}
```

Sample web handler



```
    METHOD OVERRIDE PROTECTED INTEGER HandleGet (poRequest AS OpenEdge.Web.IWebRequest):

        DEFINE VARIABLE response   AS OpenEdge.Web.WebResponse       NO-UNDO.
        DEFINE VARIABLE writer     AS OpenEdge.Web.WebResponseWriter NO-UNDO.

        DEFINE VARIABLE jsonObject AS JsonObject                     NO-UNDO.

        DEFINE VARIABLE iCustNum   AS INTEGER                        NO-UNDO.
        DEFINE VARIABLE cCustNum   AS CHARACTER                      NO-UNDO.

        EMPTY TEMP-TABLE ttCustomer .

        response = NEW WebResponse().
        writer = NEW WebResponseWriter(response).

        cCustNum = poRequest:GetPathParameter("CustNum") .

        ASSIGN iCustNum = INTEGER (cCustNum) NO-ERROR .
```



```
jsonObject = NEW JsonObject().
jsonObject:READ(TEMP-TABLE ttCustomer:HANDLE).

response:StatusCode = 200.
response:ContentType = "application/json".

writer:Write(jsonObject:GetJsonText()).

writer:Flush().
writer:Close().

RETURN 0.
```

Using parameters

- Access to path parameters:

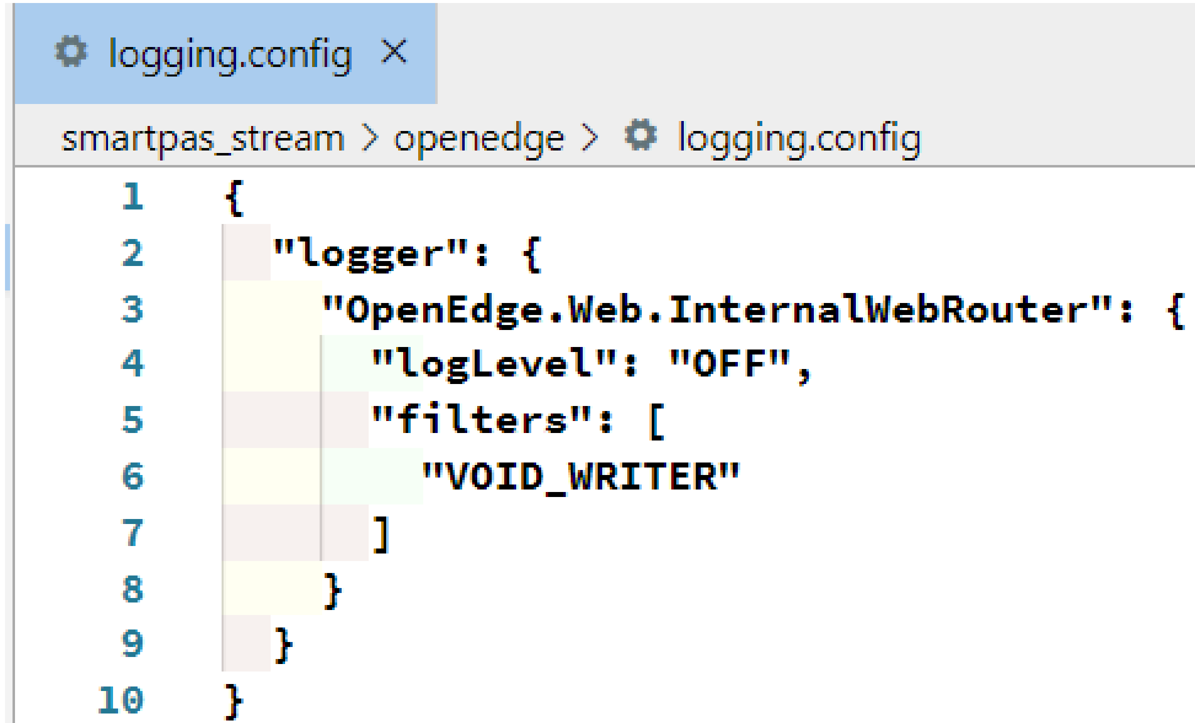
  poRequest:GetPathParameter (“CustNum“)

Demo Web handler

- Review sample web handler
- Register in .handlers file
- Execute requests

WebHandler tuning

- By default, OpenEdge logging framework initialized for every request, even when not used
- Create logging.config file anywhere in PROPATH
- Gains 8-15 msec per request (YMMV)



```
{
  "logger": {
    "OpenEdge.Web.InternalWebRouter": {
      "logLevel": "OFF",
      "filters": [
        "VOID_WRITER"
      ]
    }
  }
}
```

Additional PASOE Web Apps

- oeabl.war – support multiple ABL application in a single PASOE instance
- oemanager.war – management API for PASOE
- oedbg.war – debugger support for PASOE
- oehealth.war – health check web application
- oediagstore.war – storage for profiler logfiles in an OpenEdge DB

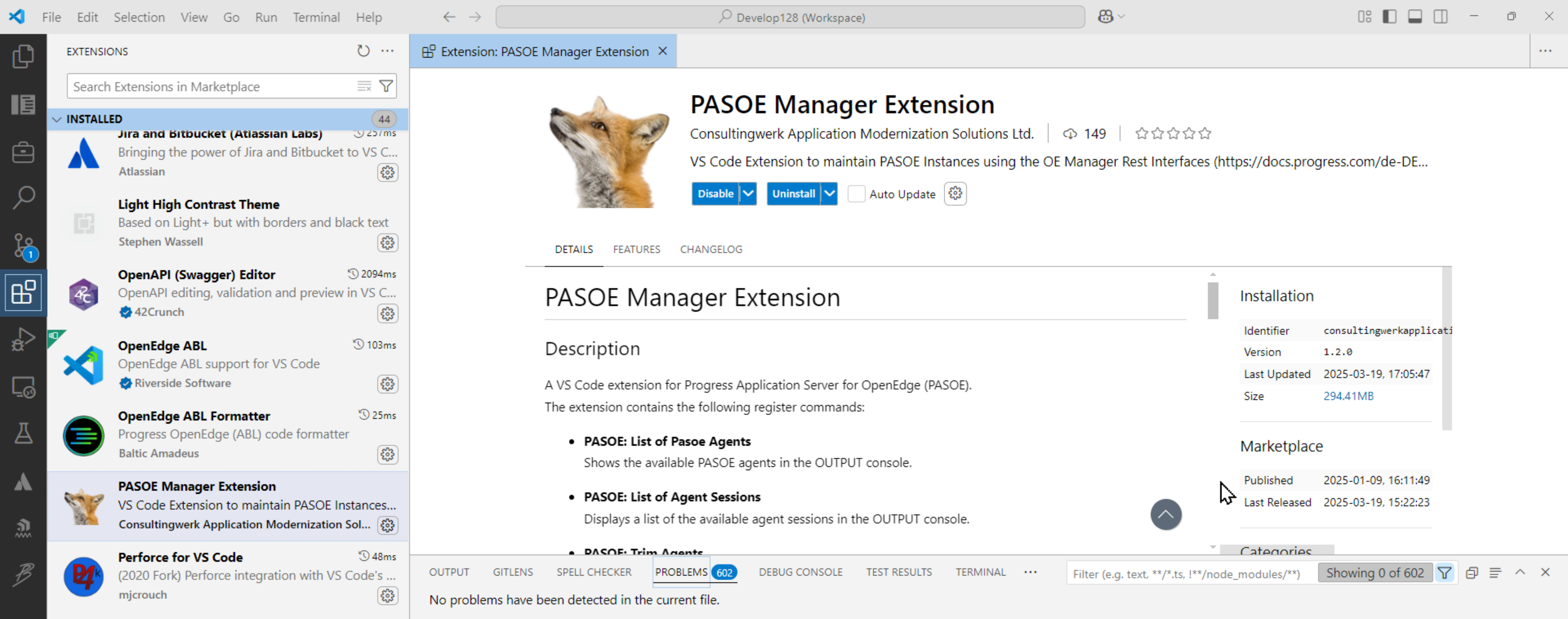
Demo additional Web Apps

- Deploy additional oeabl.war
  - Review openedge.properties
- Deploy oemanager.war
- Deploy oedbg.war

Demo oemanager

- Swagger / OpenAPI reference
- Execute requests in browser
- Execute requests from OpenEdge application

oemanager VS Code Extension



Jira and Bitbucket (Atlassian Labs) 257ms
Bringing the power of Jira and Bitbucket to VS C...
Atlassian

Light High Contrast Theme
Based on Light+ but with borders and black text
Stephen Wassell

OpenAPI (Swagger) Editor 2094ms
OpenAPI editing, validation and preview in VS C...
42Crunch

OpenEdge ABL 103ms
OpenEdge ABL support for VS Code
Riverside Software

OpenEdge ABL Formatter 25ms
Progress OpenEdge (ABL) code formatter
Baltic Amadeus

PASOE Manager Extension
VS Code Extension to maintain PASOE Instances...
Consultingwerk Application Modernization Sol...

Perforce for VS Code 48ms
(2020 Fork) Perforce integration with VS Code's ...
mjcrouch

PASOE Manager Extension

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VS Code Extension to maintain PASOE Instances using the OE Manager Rest Interfaces (https://docs.progress.com/de-DE...

PASOE Manager Extension

Description

A VS Code extension for Progress Application Server for OpenEdge (PASOE).
The extension contains the following register commands:

- **PASOE: List of Pasoe Agents**
  Shows the available PASOE agents in the OUTPUT console.
- **PASOE: List of Agent Sessions**
  Displays a list of the available agent sessions in the OUTPUT console.
- **PASOE: Trim Agents**

Installation

Identifier	consultingwerkapplicati
Version	1.2.0
Last Updated	2025-03-19, 17:05:47
Size	294.41MB

Marketplace

Published	2025-01-09, 16:11:49
Last Released	2025-03-19, 15:22:23

Categories

No problems have been detected in the current file.

oemanager VS Code Extension

- https://marketplace.visualstudio.com/items?itemName=ConsultingwerkApplicationModernizationSolutionsLtd.oemanager
- Typical PASOE interactions during development
- Agent status
- Agent sessions
- Trim Agents
- PING Agents

SOAP and REST Transports

- Web Services Adapter (OpenEdge 10) and REST Adapter (OpenEdge 11.2) integrated into PASOE
- No more deployed in separate Tomcat (or Java AppServer or your choice)
- May require HTTP proxy in DMZ as PASOE typically inside the network
- Web Service Adapter requires ProxyGen to build WSM file
- REST Adapter requires PDSOE to build paar file
- Changes in URL require updates of clients, or use of URL rewrites in PASOE

SSL / TLS

- conf/catalina.properties
- conf/server.xml -> SSLHostConfig

Authentication options

- None = anonymous
- Local = Tomcat user‘s file
- LDAP and Active Directory
- OE-Realm = ABL Class for Authentication
- STS = PASOE as Authentication Gateway

Authentication options

- Basic authentication
- Form based authentication
- SSO
- OAuth2
- SAML

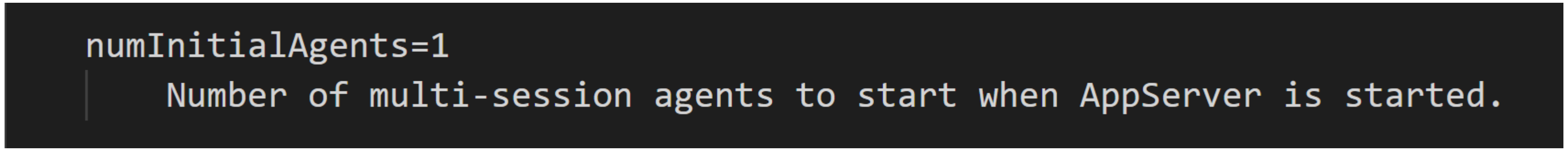
PASOE challenges – strategy for request execution

- Classic AppServer: round-robin, attempt to spread load over all available agents
- PASOE: first available session (in order they were started) gets used the most
- Idea is to reduce memory consumption as fewer sessions are needed when there is not a lot of load, reduce initialization time of sessions (session startup procedure)
- Challenge is that memory leaking ABL code has more severe impact in sessions

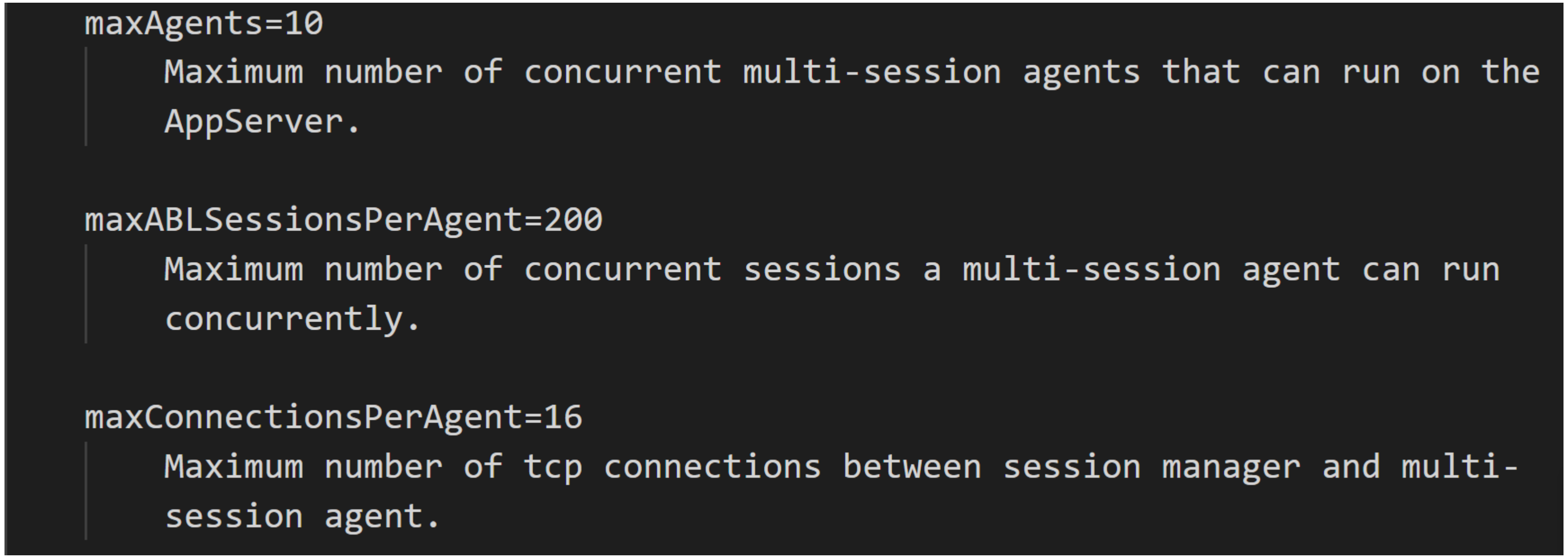
PASOE challenges

- Agent process memory consumption is the sum of all session's memory
- Agent crash due to memory issues impacts all sessions in the agent process

Session Manager Configuration



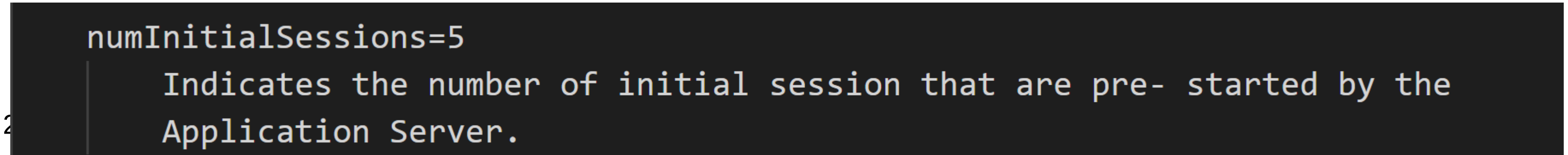
```
numInitialAgents=1
    Number of multi-session agents to start when AppServer is started.
```



```
maxAgents=10
    Maximum number of concurrent multi-session agents that can run on the
    AppServer.

maxABLSessionsPerAgent=200
    Maximum number of concurrent sessions a multi-session agent can run
    concurrently.

maxConnectionsPerAgent=16
    Maximum number of tcp connections between session manager and multi-
    session agent.
```



```
numInitialSessions=5
    Indicates the number of initial session that are pre- started by the
    Application Server.
```

Session Manager Configuration

- Higher costs for OS calls
- OS-COMMAND and INPUT THROUGH seem to require delays for thread-synchronization and forking of the OS environment
- Potentially also high requirement for OS memory on Linux when forking shell process from MS-Agent (INPUT-THROUGH, OS-COMMAND, …)

Questions

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