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Agenda



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- What is CICS Dynamic Scripting
- Dynamic Scripting Feature Pack 1.0, 1.1
- Dynamic Scripting Feature Pack 2.0
 - What's new
 - How it works
 - How to use it
- Debugging
- Migration

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Notes:

- This session will start off by discussing the need for CICS's PHP support (called CICS Dynamic Scripting)
- We will touch on the previous releases of CICS Dynamic Scripting. The Dynamic Scripting V1.0 and V1.1, which ran in CICS TS V4.1 and CICS TS V4.2, used Project Zero technology, which has been withdrawn by IBM
- We will talk about the CICS Dynamic Scripting Feature Pack (2.0) for CICS TS 5.1.
 - Installation
 - Configuration
 - Developing PHP applications
 - · Migrating your Project Zero applications
 - · Debugging your PHP application



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CICS Dynamic Scripting



- In our typical mainframe development, we normally only address mission-critical applications. Because these applications are normally high-volume and are very important to our business, we have surrounded them with procedures with tight controls that insure quality, consistency, availability and all of the other attributes needed for our main applications. These applications are normally written in COBOL, PL/I, C, Assembler, or, Java running in CICS or in WebSphere Application Server. These provide industrial-strength environments for our applications.
- Besides these main applications, there are other applications our business needs for special situations, For example, we might want to quickly create a report or a dashboard that shows an application's details. These kinds of applications are commonly called 'situational applications'. For most situational applications, time to value is more important than enduring value. In another words, the quicker the better.
- The demand for situational applications at some companies, has become more and more important, but due to the procedures and development techniques we use, it is sometimes hard for people have time to address them.
- CICS Dynamic Scripting is intended to address some of these shortcomings. CICS Dynamic Scripting version V1.0 and V1.1, built on Project Zero technology, provides a productive environment that can be used to address situational applications. CICS Dynamic Scripting is also a great way to introduce new IT staff to CICS via the PHP and Groovy dynamic scripting languages. Now, for CICS TS V5.1, we have CICS Dynamic Scripting 2.0.

CICS Dynamic Scripting FP 1.0, 1.1



- Technology from **Project Zero**, WebSphere sMash v1.1.1.3 (projectzero.org)
 - Project Zero has been removed
- Robust environment for situational reports, dashboards, and Web feeds
- Provides PHP and Groovy support in CICS agile, productive environment
- Zero Resource Model (ZRM) with data managed by DB2 for z/OS
- Uses CICS TS V4.1 and CICS TS V4.2 JVMServer Technology
- Manageability, Scalability, and Security
- Situational applications Quickly try business ideas
- Introduce new staff to CICS via PHP
- Run unmanaged PHP and WebSphere sMash applications in CICS
- Easily expose CICS assets with RESTful interfaces
- Feature Pack 1.0
 - Optional no charge product extension to CICS TS V4.1
- Feature Pack 1.1
 - Optional no charge product extension to CICS TS V4.2



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- The most important functions in CICS Dynamic Scripting Fix Pack V1.0 and V1.1 are listed.
- The feature pack is built based on technology called "Project Zero" which was an open source project. It provided a robust environment for situational applications like, reports, dashboards and so on.
- You could exploit many of the features provided by the Project Zero technology to quickly and easily build custom services and applications around your CICS programs and data, for example, to expose CICS assets RESTfully, access DB2 for z/OS through the Zero Resource Model and so on.
- CICS Dynamic Scripting applications consist of scripts e.g. PHP or Groovy, that you write, and configuration files used by Project Zero on the zFS file system. They could be developed with the tooling of your choice. You could edit the files directly in zFS or use the CICS Explorer (or RDz) to edit files remotely.



CICS Dynamic Scripting Feature Pack 2.0



- Each version of Dynamic Scripting is specific to a version of CICS. The Dynamic Scripting Feature Pack version 2 is developed for CICS Transaction Server for z/OS®, Version 5 Release 1 only; earlier releases are not supported
- You can use the feature pack to take advantage of the following web technologies:
 - A dynamic scripting CICS-based run time for PHP applications
 - Java as a programming language (you can switch between the two programming languages)
- The CICS Dynamic Scripting Feature Pack 2.0 is developed using the Liberty technology and the P8 (PHP Engine)

N	otes:
	Technesge - Scientifica - Pounts
•	CICS TS 5.1 was GA December 2012. In this release, Java 7 is supported. Based on Java 7, IBM delivered CICS Dynamic Scripting Feature Pack 2.0 in 3Q 2013. CICS Dynamic Scripting Feature Pack V2.0 is for CICS TS 5.1 only.
•	In CICS Dynamic Scripting V2.0 Feature Pack, there is a big architectural change (from V1 and V1.1) and lots of new functions. A CICS user runs the PHP in the Liberty Server. The PHP Engine underneath is the P8 PHP Engine.





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Liberty Profile In CICS







OSGi Bundle Lifecycle



OSGi Bundle States

Starting

Active

Stopping

stop

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Policy: eager/lazy

refresh

update

start

 OSGi Bundles can be installed, started, stopped, updated, and uninstalled in a running system – they can go active once dependencies are resolved

instal

refresh

update

Installed

Resolved

Uninstalled

resolve

uninstall

- Can run multiple versions of the same module at the same time
- Can contain an 'activator' (a class invoked when the OSGi bundle is started)

uninstall

- Can register themselves in the service registry
- Can declare, or discover, its dependencies
- Gives CICS installable, removable Java programs
- Provides CICS program isolation/protection
- · Other capabilites





- OSGi is another layer for Java programs running in a JVM. This 'layer' gives CICS Java capabilites similar to other program languages running in CICS.
- Java programs are typically loaded from CLASSPATH (places where your Java program resides). Using regular Java capabilities, once a Java program is loaded, it cannot be unloaded (this means that there is no notion of a 'newcopy'). The OSGi framework gives removal/newcopy capability to a JVM (you can even run two different versions of the same program at the same time).
- An OSGi bundle also provides program protection: only the packages you specifically allow to be
 accessed can be accessed. You must declare any package in another OSGi bundle that is usable by
 your program.
- This means that because we run your PHP program in an OSGI environment, you PHP program also receives these benefits.



Structure of CICS Dynamic Scripting 2.0





• There is a PHP to Java bridge, so CICS's JCICS API for Java is accessible via PHP.



The Benefits of running PHP in Liberty



- Can run multiple PHP applications in one JVM server which has multi-threaded capability
- Manage PHP applications in CICS bundles CICS controls the whole life-cycle of the application
- Packaged as an OSGi EBA, so they are easily managed
- Mixed with other JEE technology, e.g. JSPs, servlets, so the user can embed PHP into JSPs
- Failures in one PHP application will not affect other PHP applications or other Java applications in the Liberty server
- The Liberty web container provides security, CICS threads, transactionality

Not	tes: s H A I
•	In CICS Dynamic Scripting V2.0, we can deploy all PHP applications in one JVM server which has multi-threaded capability. The user needs additional JVM servers only when the concurrent thread number will be larger than 256.
•	In CICS Dynamic Scripting V2.0, the lifecycle control of PHP application is simpler. You can define a PHP application as a resource in CICS. If the user wants to activate or stop a PHP application, they just enable or disable the resource in CICS. CICS Dynamic Scripting Feature Pack 2.0 is much easier for the system program to control.
•	All PHP applications are packaged as OSGi web bundles. One or more of these web bundles are packaged in to an EBA bundle (Enterprise Bundle Archive). A user then packages EBA bundles and related CICS resources into a CICS Bundle.
•	From a CICS perspective, the systems programmer configures the JVM server and a CICS Bundle resources. When the CICS bundle resource is installed into CICS, the CICS bundle becomes active.
•	Another benefit is that users can mix PHP and Java, for example, a user can embed PHP into a JSP.
•	 EBA = Enterprise Bundle Archive WAB = web application bundle

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Installation and Pre-requirement



• CICS TS 5.1 with APAR PM80214 applied

Install Dynamic Scripting Feature Pack 2.0

- Use FTP to copy the Dynamic Scripting Feature Pack 2.0 SMP/E installation package to a suitable directory in z/OS UNIX. You must have write access to this directory
- Use SMP/E to install Dynamic Scripting Feature Pack 2.0
- Setup the Dynamic Scripting Feature Pack 2.0 environment, such as an extension lib, set the Liberty bundle repository, etc.

Development environment

- CICS Explorer V5.1.1.1 or higher
- PHP Development Tools (PDT) 2.1 or higher installed in Eclipse, if you want to debug PHP code (optional)

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No	tes:
•	CICS Dynamic Scripting Feature Pack V2.0 is for CICS TS V5.1 only.
•	The user has to apply APAR PM80214 before they can use the feature pack. This APAR is for the Liberty server.
•	The installation of the CICS Dynamic Scripting Feature Pack V2.0 is managed by SMP/E. It is a standard SMP/E installation process. Download the install package, upload it to z/OS USS. Install it using SMP/E. The included Installation Guide details each step (see the CICS V5.2 InfoCenter).
•	For a development environment, you can install the optional Eclipse plug-in called "PDT" in to Windows or Linux. The PDT provides a PHP editor and a debug tool for PHP. The PDT isn't required to develop PHP scripts, but is quite helpful.





Configure Eclipse for PHP Development: One-time per workspace

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- This section details the "one-time" workspace setup needed when developing OSGi-based PHP scripts for CICS using Eclipse.
- When you use Eclipse, you have the code that makes up Eclipse, and you have a separate workspace that holds your artifacts (your application code). An Eclipse can point to one workspace at a time. These steps have to be performed for each workspace you use to contain your PHP applications.



Set up the CICS Explorer SDK – One Time...

CICS Explorer 5.1.1.1 or higher

- One Time:
 - Update target running platform Window->Preferences->Plug-in Development->Target Platform
 - Then on the right Click Add
- On the Target Definition dialog Click the radio button next to "Template", then in the pull-down next to Template, select "<u>CICS TS V5.1 Runtime with PHP</u>", then "Finish"
 - Back on the Target Platform page check CICS TS V5.1 Runtime with PHP". Then click "OK".
- → The next slide, taken from the CICS Explorer, has the views and dialogs you will see when you do the above...



Notes:



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- You need to configure the target runtime platform. This makes available, all of the files needed to support PHP on CICS.
- After the CICS explorer SDK is installed, there is a target OSGi platform called 'CICS TS 5.1 Runtime with PHP' in the list. The com.ibm.cics.php Jar file is the core file of the CICS Dynamic Scripting Feature Pack V2.0.
- If the OSGi target platform called 'CICS TS V5.1 Runtime with PHP' is not present, you likely have haven't installed the proper maintenance on the CICS Explorer. You must be at CICS Explorer V5.1.1.1 or higher.



Start CICS Explorer SDK – One Time



- Update target running platform
 - Window->Preferences->Plug-in Development-> Target Platform->Add



- Slide 25 says the same thing as slide 23. Slide 25 shows the Eclipse dialogs you will see.
- Using the pull-down beside 'Template', you need to select 'CICS TS V5.1 Runtime with PHP' and click ok.
- Note that when you return to the 'Target Platform' dialog, the prior action just added the 'CICS TS V5.1 Runtime with PHP' to your choices. You need to check the box next to 'CICS TS V5.1 Runtime with PHP' to activate it.





PHP Development: You may want to start with the supplied sample

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Notes:



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- This section talks about the PHP example provided with the CICS Explorer.
- This will easily validate that CICS Dynamic Scripting is installed properly and you are ready to develop your own PHP applications.





- The example PHP program is in the CICS Explorer SDK V5.1.1.1, and higher
- From the menu bar, File->New->Other, then Examples->CICS Examples->PHP-> CICS Dynamic Scripting Example (PHP)



Notes:

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- This section talks about the PHP example provided with the CICS Explorer.
- This will easily validate that CICS Dynamic Scripting is installed properly and you are ready to develop your own PHP applications.





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Relationship between projects and deploymen





 The PHP sample application is just to verify that PHP is properly installed and configured into your CICS.





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PHP Development: Make your own PHP project **

** This assumes you have done the one-time workspace setup (already discussed)

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• > This section assumes you have already performed the one-time workspace setup.



Croate OSGi Rundle For the Web Project

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	W New USGI Bundle Project			
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	create a standarone osor banare p		isting uppredict	
A Include OSGi Project i	Project name: com.ddw.sample.v	web		
OSGI CSGI Application Proj	Project location			
CSGi Bundle Activato	Use default location			
	Location: C:\workspaces\cics01\	Com.ddw 🙆 New OSGi Bun	dle Project	
OSGi Composite Bund OSGi Fragment Project	Target runtime	Web Module		
Examples CICS Examples	<none></none>	Configure web r	module settings	5.
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	Add Web support We	eb 3.0 Content director	y: WebConte	OSGi Bundle
	Add ElB support	8.20		Configure OSGi bundle settings.
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This is the start of	f are ating your own D			
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Add the CICS PHP package to your web project's MANIFEST.MF





Change the Activator class



package com.ddw.sample.web;





Change 'web.xml' in the PHP project



- The <servlet-mapping> maps all requests for any file that ends in .php to the PHPServlet. This would include the index.php, or any URL (file) that ends in .php.
- The <servlet> tag specifies the full name of the PHPServlet.



Write the PHP Program in the IDE



 You can use the PDT(PHP development toolkit) in Eclipse, or any other PHP IDE



- After the previous steps, which will be the same for every PHP project, you will write your code.
- In this OSGi bundle...
 - The project Activator and any supporting Java code is in your projects src directory. The warning because of the code I used in a Java class.
 - · Skipping down to the bottom, you see the initial script that will be executed.
 - In the WebContent directory is a fund directory, which contains the Cascading StyleSheets, Graphics, HTML, JavaScript, and other PHP scripts used in this application.





Place your PHP web bundle into an Application (EBA) bundle **

** You will always have to make an EBA bundle, or include your PHP web bundle in an existing EBA bundle

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- SHARE Tehnology - Genetilens - Faulth
- Once you have your OSGi bundle to contain your application, and have coded your application, you are ready to create an EBA bundle (that will contain your application bundle).
- In this section we will create the EBA bundle (Enterprise Bundle Archive) and place into it, the bundle that contains our web application. You could place your web project into a new or an existing EBA bundle.
- In yet another section in this presentation, we will create a CICS bundle and place the EBA bundle into it.



Create an EBA Project

- File->New->Other
- Select 'OSGi <u>Application</u> Project' to contain your web OSGi project
- You must place your web OSGi project into an EBA project
- It is the only packaging CICS Dynamic Scripting 2.0 supports

New Project Select a wizard Create an OSGi application project Wizards: osgi E CICS Resources a 🗁 OSGi GG OSGi Application Project SGi Composite Bundle Project 🔮 OSGi Fragment Project a 🗁 Examples a 🗁 CICS Examples a 🗁 Java CICS Bundle OSGi Example / CICS OSGi Security Agent Example ? < Back Next > Finish Cancel





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- You can add your web project into a new or existing EBA project (Enterprise Bundle Archive).
- To create a new EBA project, start by selecting from the Menu Bar->File->New->Project
- Towards the top of the Select a wizard page of New Project, you can type 'osgi' as a filter.
- Select OSGi Application Project, and click the Next button.



Place your Web project into the EBA project

5i Application Project eate an OSGi application projec	et. Project name
oject name: com.ddw.sample roject location Use default location	Include the web project
ocation: C:\workspaces\cics01	New OSGi Application Project
arget runtime :None>	Contained OSGi Bundles and Composite Bundles Add OSGi bundles and composite bundles to the application.
/orking sets Add project to working sets Working sets	Contaige I bundles and Composite Bundles (Application-Content): Com.ddw.sample.web 1.0.0 Clear All Clear All Clear All Clear All New Bundle New Composite Bundle
	KBack Next > Finish Cancel SHARE In Anaheim

- On the OSGi Application Project page of the New OSGi Application Project wizard...
- Type in the project name (we used com.ddw.sample.app), uncheck 'Add project to working sets', then click the Next button.
- On the 'Contained OSGi Bundles and Composite Bundles' page you would check the boxes next to your web project that contains your PHP application. The click the Finish button.



Change the EBA Bundle Manifest



- In your EBA project (we called our com.ddw.sample.app), in the META-INF directory is your projects manifest named APPLICATION.MF
- · Double-Click the APPLICATION.MF file to open it in an editor
- · For the 'Version', take off the .qualifier
- Note that you can also add or remove bundle projects from your EBA bundle by using the add and remove button on the middle of the page





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Place your EBA bundle into a CICS bundle, and export to z/OS **

** You can place your EBA file into an existing CICS bundle

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- Next, you will put your EBA bundle into a CICS bundle and export the CICS bundle from your workstation to z/OS Unix System Services.
- Note that you could add your EBA bundle to an new or existing CICS bundle. In this presentation, we
 will create a new CICS bundle and put our EBA bundle into it



Create a CICS Bundle Project

Select a wizard Create a Project to contain the files to be referenced by Definition Wizards: type filter text CICS Resources CICS Application Binding Project CICS Application Project CICS Atom Configuration file CICS Event Binding CICS Event Processing Adapter CICS Event Processing Adapter CICS Sundle Droject in Bundle Include OSGi Application Project in Bundle Include OSGi Application Project in Bundle Include OSGi Project in Bundle	Rowse
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Version: 1.0.0	
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ICS Rundle Project	
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otes:	-
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To create a CICS bundle, from the menu bar->File->New->Project (or menu bar->File->n and select CICS Resources->CICS Bundle Project	ew->Other),
On the CICS Bundle Project page, type the CICS bundle name, and the version. Then	press Finish.



From CICS Bundle → reference your EBA



- The wizard take the highest level qualifier from your package name and adds .ebabundle after it. If you want to change this name to contain more information, the easiest way is to press the Back button and change the File name to be what you want. Leave the file extension alone; the name should end in .ebabundle.
- Then press the Finish button.
- · Note: you could define other resources in the same CICS bundle.



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Export CICS Bundle to z/OS zFS





- All the work has been on your workstation so far, now you want to export your CICS bundle project to z/OS
- Right-click your CICS bundle project, and from the context menu, select 'Export Bundle Project to z/OS UNIX File System'
- Specify the z/OS directory into which you want the CICS bundle placed
- Check the 'Clear existing contents from Bundle directory' if you if the bundle directory already has something in it.





Summary of development steps...

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Notes:

• This section summarizes the development steps...



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PHP development is done, on to CICS !



.....

- 1. Setup target runtime in the CICS explorer
- 2. Create Web application that will contain the PHP
- Create OSGi application project (EBA) to package PHP project
- 4. Create CICS Bundle project to manage lifecycle of PHP application (i.e include the EBA)
- 5. Deploy the CICS Bundle to z/OS USS

Then, in CICS, you can:

- Configure and start the runtime in CICS if it is the first PHP application in your CICS region
- Install the CICS bundle to install your PHP app into CICS
- · Covered on the next slides...

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Notes:	-57
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• It also summarizes the steps we will cover next; deploying your PHP program in CICS.





Configure a Liberty Server for PHP, and try your application...

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Notes:

- Your PHP application runs in a Liberty server containing PHP support. We will cover these items on the following pages.
- · We will define a Liberty Profile under CICS
- We will add PHP support to the Liberty Profile
- We will deploy your PHP application
- We will test the application



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Test your PHP application

Input URL http://your.url:port/ddwweb



• Note ddwweb is the application "context root"

Fund Access Home	
Display Fund	Simple Fund Access Application Main Page (PHP)
Add Fund	
Update Fund	Welcome to the simple Fund Access Sample Application.
Delete Fund	This sample application uses CICS TS V5.1 to display all Web Pages, Graphics, JavaScript files,
Browse Funds	and Cascading Style Sheets. The Create, Read, Update, and Delete functions you see on the menu on the left invoke a Java program running in CICS TS V5.1. This Java program uses a VSAM file to store the application data. This program is invoked with a COMMAREA, so this program could also be written in any language that CICS supports. The CICS Web Support can also invoke container based programs (introduced in CICS TS V3.2 as the way to exceed the 32K COMMAREA limit).
	Choose one of the menu options on the left to exercise the Java program.
	Note: If you have any questions or comments, please let us know.
	Copyright (c) 2006-2014 by IBM corporation
	SHARE
	••• <mark>In Anah</mark>
otes:	S H A
tes: This is a test o	f the application
)tes: This is a test o For this applic:	f the application ation, ddwweb is the context root



Overview of PHP in CICS





Note: Character Encoding



.....

 The Liberty profile is running in an ASCII JVM – you want the data in EBCDIC when you use the CICS API



(a TSQ was used because it is the simplest API) (this sample is in the CICS V5.1 InfoCenter)

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Liberty runs in an ASCII JVM	

 Anything you want to write to CICS will have to be in code page 037 (or the code page of your country). The com.ibm.cics.jvmserver.local.ccsid contains your code page.





Debugging your PHP application...

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Notes:

• This section is on debugging your PHP application in CICS.





Logs and Configuration File



- The CICS messages in the message log are likely to contain essential information.
- Then per the last slide, there is the stdout and stderr in the log directory referenced by your JVM profile.
- · There are also Liberty log files as reference on the last slide.











- This indicates that I have no index.php in the PHP project's
 WebContent directory
 - The initial script so PHP couldn't find initial page
- This was in the DFJVMERR file and one of the .log files

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Notes:	







A before and after image of every CICS EXEC command



PHP Debugger

• Debugger is in PDT 2.1 or higher

Preferences

type filter text

Ant Data Management

Help Install/Update Java

Java EE Java Persistence

PHP

JavaScript

Appearance

Code Style

Installed Debuggers

Workbench Options

New Project Layout

Path Variables PHP Executables

PHP Interpreter

PHP Libraries PHP Manual

PHP Servers Plug-in Development

Remote Systems

Run/Debug

Server

Team

Debug

Editor

General

Dynamic Languages Explorer . . .

Installed Debuggers

Installed Debuggers

General Set

Debug Port

Max array depth

Use Multisession

Accept remote session (JIT)

Output Capture Settings

Max children

Capture stdout

Capture stderr

Use Proxy

IDE Key

DBGp Proxy Support

ECLIPSE_DBGP_111.37.47.19

XDebug/DBGp Settings

Show super globals in variable view

Debugger Type

XDebug

0

Port

9000

9000

3 💠

31

prompt

off

off

- XDebug
 - Port
 - Accept remote session

(this is on the workstation side)



Notes:



- The PHP debugger is in the PDT tools that you can install into your Eclipse environment.
- You need to configure it.
- It will be contacted by your CICS





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Configure

- 23

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Debug - JVMProfile

• Update JVMProfile



-Dp8.debug=idekey=ECLIPSE_DBGP& remotePort=<port>&remoteHost=<ip_address>

Notes: • In CICS, in the JVMProfile, we need to add -Dp8.debug=idekey=ECLIPSE_DBGP8. • Specify the remote port and the hostname of the Eclipse PDT debugger your workstation. • This will contact the debugger on our workstation, and will trigger a debug view similar to the Java debugger.	Notes: • In CICS, in the JVMProfile, we need to add -Dp8.debug=idekey=ECLIPSE_DBGP8 • Specify the remote port and the hostname of the Eclipse PDT debugger your workstation. • Applied to the debugger on our workstation, and will trigger a debug view similar to the Java debugser. • Applied to the debugger on our workstation, and will trigger a debug view similar to the Java debugser.		WP Debug W Servers Image: Constraint of the session (PHP Web Application) Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Application Image: Phy Appl	● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●	Nes 2 % Breakpoints 42 Expression GLOBALS _FILES _ERV _GET _POST 	Interactive Console Value Array [10] Array [10] Array [15] Array [0] Array [0] Array [16]
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Migrating CICS Dynamic Scripting V1.0 and V1.1 applications...

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Notes:





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 This section provides a general overview of changing a CICS Dynamic Scripting V1.0 or V1.1 application to use CICS Dynamic Scripting V2.0.



Migrating CICS Dynamic Scripting 1.0,1.1 Apps





Summary



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- What is CICS Dynamic Scripting
- Dynamic Scripting Feature Pack 1.0, 1.1
- Dynamic Scripting Feature Pack 2.0
 - What's new
 - How it works
 - How to use it
- Debugging
- Migration



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