Object Name Service Object Name Service

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Introduction



In this document, we shall present an implementation of the Object Name Service (ONS) as defined in the EpcGlobal framework. The ONS service (both local and root) shall:

- (For the root ONS) Given an EPC, can return a list of network accessible service endpoints that
 pertain to the EPC in question. ONS does not contain actual data about the EPC. It only contains the
 network address of services that contain the actual data. ONS is also authoritative in that the entity
 that has change control over the information about the EPC is the same entity that assigned the EPC
 to the item to begin with. For example, in the case of an SGTIN EPC, the entity having control over the
 ONS record is the owner of the SGTIN manager number (EAN.UCC Company Prefix)
- (For the local ONS) Fulfills ONS lookup requests for EPCs within the control of the enterprise that operates the Local ONS; that is, EPCs for which the enterprise is the EPC Manager.

Along with the implementation of the ONS server, an application that enables tracking of products between inter-enterprise EPCIS repositories is provided. This application shall

- Implement and expose a new /tracking interface for the ASPIRE Information Sharing Repository, along with the /query and /capture interfaces. This new interface can be used by an external accessing application to obtain data about any EPC tag belonging to this particular company/repository. Data includes both events from the local repository and data reported from foreign domains as products move to them. The tracking interface is a SOAP interface.
- Collect data reports about an EPC tag from foreign tracking deployments. Data includes at least time, date, geographical coordinates and information about the company which received the item and issued the data. Data can also include details about the particular item (name, features, price, date of production e.t.c) if available. All data of this kind is stored in a local database, separate from the EPCIS repository database.
- Poll the attached EPCIS repository periodically for any events regarding EPC tags having a company identifier different than the one designated as 'parent company'. Events are grouped together by company, a query is send to the ONS server for an EPCIS/tracking service endpoint, and an attempt is made to report the events.

User Guide

Requirements

Hardware (minimum)

- P IV 1.2GHz or equivalent
- 512 MB Ram
- 50 MB free HD space

Software

- Java 1.6
- Tomcat 6.0 (or higher) or another server for web-services. (This guide assumes that you use an Apache Tomcat server.)
- MySQL 5.0 (or higher).

Deployment

This section includes a step-by-step tutorial describing how to set up your own ONS server and the tracking application add-on to the Epcis Repository

- Download and install a fully functional EPCIS repository, following the instructions on the appropriate wiki page. Populate the repository with sample data.
- Download aspireRfidOnsTrackingService.zip from the project Forge page.

Database installation and creation

The tracking application was developed (and is preconfigured) to work with the open source MySQL relational database. Following are installation and configuration instructions for the MySQL database, along with a brief guide on how the user can configure the application to work with other relational databases. The installation instructions refer to a windows platform (although most of them apply to linux platforms also)

- MySQL installation (skip this step if MySQL is already installed in your system)
 - Go to <u>http://www.mysql.com/downloads/mysql/</u> and download the MySQL community server (version 5.5.8 as of writing this document) package appropriate for your operating system (for windows platforms choose the .msi installer)
 - Follow the instruction and install MySQL at a place of your choosing. Accept all default parameters (unless you have other needs and you know what you are doing). Make sure you choose to start the server after the installation is done
 - During the installation you will be asked to create the 'root' user. Create the user and note down the password for later use.
 - Go to <u>http://www.mysql.com/downloads/workbench/</u> and download the MySQL Workbench (version 5.2.31a as of writing this document) package appropriate for your operating system
 - Install MySQL workbench and launch it. From the main screen of the program select 'New connection'.

MySQL Workbench	And in case of the local division of the loc	the second s	– 0 ×
File Edit View Model Database Plugins Scripting Community	Help		
1 😢 🗨 🔒			
Home			• ×
Vorkbench Central			
			Check for Updates
Welcome to MySQL Workbench			
What's New in This Release? Workbench	Dev-Central Blogs		Submit a Bug Report
[Molkberch]			Discuss a Topic
Workspace			
SQL Development Contect to existing databases and run contect to existing database and run manage database objects.	Create and manage models, forward & Create and manage models, forward & synchronize schemas, report.	Configure your database server, setup user accounts, browse status variables and server logs.	
Open Connection to start Querying Or click a DB connection to open the SQL Editor.	Open Existing EER Model Or select a model to open or click here to browse.	Server Administration Or clck to manage a database server instance.	
Kecal User root Hest: 127.0.0.1.3306 Ver Connection Kex Connection Add a new database connection for querying. Contact and additional schemes table to add Set Table Dotat	TrackingDB.mwb Last moduled Tea Nov 23 19:14:14 2010 Image: PCIS_eposymble Last moduled Ved Jul 4 19:01:02:2010 Image: PCIS_eposymble Last moduled Sun Jul 11:22:29:33:2010	New Server Instance Register a new server instance to manage. Transage Import / Export Tensage Import / Export Export Tensage Import / Export Export Tensage Import / Export	
Edit SQL Script Open an existing SQL Script file for editing.	Create and W EEK Model from Existing Database Create EER Model from Existing Database Create by connecting and reverse engineering.	Manage Security Manage user accounts and assign privileges.	
Manage Connections Modify connection settings or add connections.	Create EER Model from SQL Script Import an existing SQL file.	Add, delete and update server instance settings.	
Courd not connect to target database.			

• The following screen should appear

Manage DB Connection	ons		x
Connection Name:			Type a name for the connection
Connection Method:	Standard (TCP/IP)	`	Method to use to connect to the RDBMS
Parameters Advan	nced		
Hostname:	127.0.0.1 Port:	3306 Name or IP address of the server host - TCP/IP p	ort
Username:	root	Name of the user to connect with.	
Password:		The user's password.	
Default Schema:		The schema that will be used as default schem	a
		Test Con	nection Cancel OK

- Give a connection name of your liking. If you installed MySQL with the default parameters then hostname should be 127.0.0.1 and port should be 3306. Leave the username as root and enter the password you selected during installation. Press the 'Test Connection' button to make sure everything is ok and then 'OK'. The connection should have now appeared to the list on your left on the main screen of the program.
- Select 'New Server Instance -from the list on the right of the main screen
- On the popup screen select localhost

Create a new server instance		
Specify Host Machine	Specify the Host Machine the Database Server is running on	
Operating System		
Host SSH Connection		
Test Settings	If your database server is running on the same machine as this application sel specify the TCP/IP address or the network name of the remote machine.	ect Localhost. Otherwise please
Database Connection	O Localhost	
Test DB Connection	Remote Host	
MySQL Config File	Address:	Either IP Address or Hostname
Specify Commands		
Complete Setup		
Results		
91/1/		
	Back	Next Cancel

• Select your software platform



· Ignore any missing configuration file warnings

Create a new server instance		x
Specify Host Machine	Testing Host Machine Settings	
Operating System	·······	
Host SSH Connection	The connection to the host machine is being tested. This might take a few moments depending on your network	
Test Settings	connection.	
Database Connection	 Connect to host machine 	
Test DB Connection	Check location of Administration commands	
MySQL Config File	X Locate database configuration file	
Specify Commands	Error: File %ProgramFiles%\MySQL\MySQL Server 5.1\my.ini doesn't exist	
Complete Setup		
Results		
(Cono		
	Show Long	

• Select the connection you created on the previous step

Create a new server instance				
Specify Host Machine	Set the Database Connection values			
Operating System				
Host SSH Connection	Open the connection manager to manage your connections and select one of them below.			
Test Settings				
Database Connection	Open Connection Manager			
Test DB Connection	Select Connection:			
MySQL Config File	local (User: root Host: 127.0.0.1:3306)			

· Give a name your newly created instance and you are done

Create a new server instance				
Specify Host Machine	Create a instance			
Operating System				
Host SSH Connection	Please enter a name for this new server instance and dick Next. A new Server Instance entry will be created for			
Test Settings	this database.			
Database Connection	Server Instance Name TrackingDB			
Test DB Connection				
MySQL Config File				
Specify Commands				
Complete Setup				
Results				
	Back Next Cancel			

- ^o By double clicking the instance you created, you can manage all aspect of your mysql_server. If the server is not running, you will get a warning. Select 'continue anyway' and you can start the server from there .
- Schema creation and user configuration
 - The following instructions and provided scripts assume that you used MySQL community edition as your relational database. If you used any other database, then the needed schema must be created manually according to the provided EER diagram
 - ^o Double click the connection you created in the previous part of the guide -make sure the server is running. The following screen should appear

MySQL Workbench	— D X
File Edit View Model Query Database Plugins Scripting Community Help	
2 🔁 🖬 💷 🖉 🐼 🔩 🞯 🌚 🕲 🖚 🛇 🛨	
Home Admin (MySQL_LocalInstance) SQL Editor (local)	Connection Information
▼ SQL Statements	Name: local Host: 127.0.0.1
1	Port: 3306
	User: root
	Schemata II X
	Default:
	epcis
	epcis_tracking
Overview Output History	information_schema mydb
Overview 55 111 = + -	🖽 🧃 mysql
information_schema epcis and schema epcis tracking information and the schema epsilon and the schema ep	
Tables (28 items)	
Add Table OHARACTER_SETS COLLATION_OHARA COLLATIONS COLLATION COLLATION BYRNES EVENTS FILES G.CORA_STATUS G.CORA_VERVARES EVENTS FILES G.CORAVERVARES FILES G.CORAVERVARES FILES	
Views (0 items)	
Add View	
Routines (0 items)	
Add Routine	
	Schemata SOI Sninnets
SQL Editor Opened.	E scremara in sol subbes

- Select 'File->Open SQL Script' and choose the provided TrackingDBCreation.sql you downloaded
 - Run the script. It should create the needed schema for the tracking application. The script does not create any users or grant any privileges to the schema. These have to be created manually. Close the SQL editor and double click the database instance you created -from the right part of the main program screen.

📉 MySQL Wor	rkbench			
File Edit View Model Database Plugins Scripting Community Help				
1 😢 💽	a 🔒			
Home	Admin (MySQL_LocalInsta	ce)		▼ ×
▼ Server S	Status			
INFO		SYSTEM SERVER HEALTH		
	Host: 127.0.0.1	ance		
	Server: Unknown Status: Running	CPU: 6% Mem: 37% Connection Usage: 2	Traffic: 7.12 KB/s Query Cache Hitrate: 0.	.00% Key Efficiency: 50.00%
Configur	ration			
Start	rtup /Stop Server 🥁 Edit C	guration higuration File Accounts Manage Users Connection List	Variables Status and Server Vars Data Dump Eport / Import Data Server Log Files	
Server Access M	Aanagement Schema Privile	es		
User Accounts	1	Select an Account to Edit		
User	From Host	Login Administrative Roles Account Limits		
	localhost	Login Name:	You may create multiple accounts with the same name to connect from different host	ts.
root	localhost	Password:	Type a password to reset it.	
		Confirm Password:	Enter password again to confirm.	
		Limit Connectivity to Hosts Matching	% and wildcards may be used	
	1			
	/			
Add Account	Remove			Revoke All Privileges Revert Apply
SOL Editor One	nod			

• Select the accounts tab, and click 'Add account'

• Input a login name, password, localhost as the host matching criteria and click apply (see photo for details). Note down the username and password.

Server Access Ma	anagement	Schema Privileges				
User Accounts			Detail	s for Account newuser@%		
User	From Host		Login	Administrative Roles Account L	imits	
epcis kmour	% localhost			1 Login Name:	tracking	You may create multiple accounts with the same name to connect from different hosts.
root smich	localhost localhost			2 Password:	******	Type a password to reset it.
newuser	%		F	3> Confirm Password:	******	Enter password again to confirm.
			Limi	t Connectivity to Hosts Matching:	localhost	% and _ wildcards may be used
				Æ	*	6]
Add Account	Remove]				Revoke Al Phylopes Revert, Apply

- Go to the 'Schema Privileges' Tab. Select the user you just created and click on 'Add Entry'
 On the screen that will pop-up choose: SelectedHost:localhost and SelectedSchema: epcis_tracking. Then press 'Ok'.

New Schema Privilege Definition	
Select the Host and the Schema for whi will have the privileges you want to defi Host	th the user 'tracking' ne.
Any Host (%)	
Hosts matching pattern or name:	
Selected host:	localhost 👻
Schema	
Any Schema (%)	
Schemas matching pattern or name	e:
Selected schema:	epcis epcis_tracking information_schema mydb mysql
	Cancel

- On the bottom of the screen click 'Select ALL' to give the new user all privileges on the schema and then 'Save changes'
- We are now ready. Next step is to edit the application configuration files for database access and for our company .

Application configuration files

There are 2 main configuration files that should be edited according to the database installation and the user needs. The first file is about the Hibernate O/R mapping framework our application uses to access the database. The second is the properties file for the application. Extract the aspireRfidTracking.war file you downloaded to a folder in your hard disk. It should create 2 folders named WEB-INF and META-INF. You can use any archive manager you like (a free option for Windows based platforms is 7-Zip)

..\WEB-INF\classes\hibernate.cfg.xml

- "hibernate.connection.driver_class"
 - ° Default: "com.mysql.jdbc.Driver"
 - ^o Set: Don't change if you used MySQL. In other cases change this to the class name of your connector class
- "hibernate.dialect"
 - ° Default: "org.hibernate.dialect.MySQLDialect"
 - Set: Don't change if you used MySQL. In other cases, consult the appendix for a dialect that matches your database provider (or the Hibernate Documentation for more resources)
- "hibernate.connection.username"
 - ° Default: "user"
 - ° Set: Change this to the username of the user you created on the previous step
- "hibernate.connection.password"
 - ° Default: "pass"
 - ° Set: Change this to the password of the user you created on the previous step
- "hibernate.connection.url"
 - ° Default: "jdbc:mysql://localhost:3306/epcis_tracking"
 - [°] Set: Don't change if you used MySQL and installed with default options. In other case consult your software vendor's manual.

..\WEB-INF\classes\tracking.properties

- localEpcisInterface
 - ^o Default: http://localhost:8080/aspireRfidEpcisRepository/query
 - ° Set: The query interface URL of the EPCIS repository the tracking application is attached to
- localONS_Resolver
 - ° Default: 127.0.0.1
 - ° Set: IP of the local ONS server (see ONS section for more details)
- exportedEpcisInterface
 - ° Default: http://localhost:8080/aspireRfidEpcisRepository/query
 - Set: This is what will appear as the remote URI to the foreign tracking application. It can be used by the other party to obtain more information about reported epc events
- companyName
 - Default: ASPIRE Inc.
 - ° Set: Your company name
- companyDesc
 - ^o Default: RFID Solutions
 - ° Set: A brief description of your company
- companyAddress
 - ^o Default: 19.7Km Markopoulou Ave
 - ° Set: Company's address.
- companyCountryCode
 - ^o Default: GR
 - ° Set: Company's country code.
- companyRegion
 - ^o Default: Attica
 - ° Set: Company's region, state or province e.t.c
- companyEmail
 - Default: komo@aspire_inc.gr
 - ° Set: Contact email
- companyTel
 - ° Default: +302106671836
 - Set: Contact landline
- companyFax
 - ° Default: +302106672478
 - ° Set: Contact Fax
- companyIdentifier
 - ° Default: 000
 - Set: This is the unique company identifier as defined by the EPCIS standard. This numerical in always the first component on any epc urn that is assigned to the company domain. The application uses this to filter out any data from the local EPCIS repository that are for own epc tags.

- lattitude
 - ° Default: 37.939605
 - ° Set: A default latitude attribute for generated events that don't carry such information. Can be set to any relevant to the epcis repository location.
- longtitude
 - ° Default: 23.874013
 - ° Set: As above
- pollPeriod
 - ° Default: 10000
 - ° Set: The poll interval (in msec) the program should wait before it checks for any new events to report
- startTimeDate
 - ° Default: 2010-10-04 18:09:24
 - ° Set: On startup, the tracking interface will only poll for events newer that this time/date. This is updated every time a poll is made, so we get only the newer events each time .

After you have edited the files, repack everything into the original archive aspireRfidTracking.war . ONS installation

• Platform choice and implementation

As per the ONS specification, each company assigned part of the epc namespace, should maintain an appropriate ONS server for that namespace. Our application uses these ONS servers to find out the appropriate foreign tracking interfaces to report epc events. The ONS server is actually a properly configured DNS server with NAPTR records for the part of the namespace the server is qualified. Any DNS implementation and platform combination is a valid option. We used the popular, open source and reference BIND implementation of DNS on windows machines. Ideally a realistic setup for our application involves one ONS server per company. For demonstration needs we will present a setup where a single ONS server contains information for EPC's belonging to several different domains. The guide assumes at least basic information on what DNS (very helpful on this matter is the BIND manual available at http://www.isc.org/software/bind/documentation).

- DNS Installation
 - Go to <u>http://www.isc.org/downloads</u> and select 'Windows Download' of the latest BIND release (version 9.7.2-P3 as of writing this guide).
 - Follow the very helpful instructions on <u>http://alex.charrett.com/bind-on-windows-mainmenu-3</u> up to the point of Configuring your zone (if you don't want to go though the BIND installation manual)
 - ^o The scenario also assumes that while populating your EPCIS repository with sample data, you did so with tags having at least 2 different company identifiers. Let us assume that one of them is 1 -for your company and the other one is 145 for one of your clients. Modify your named.conf according to the one provided. Also following the instructions on how to configure your zones from the site mentioned at the previous step, alter if needed the 2 provided zone files and copy them at the appropriate folder. If needed modify again the entry on tracking properties file for the company identifier.
 - ° Save everything and start the DNS service or restart it
 - Make sure it runs correctly, and that your firewall does not block traffic on TCP and UDP ports 53 (the default for DNS requests).

Final steps

Copy aspireRfidTracking.war to the Tomcat webapps folder. Launch tomcat and you should be set.

Developer Guide

Object Name Service (en) Creator: xwiki:XWiki.nkef Date: 2011/01/11 16:09 Last Author: xwiki:XWiki.kmour Date: 2011/04/17 16:17 Copyright (c) 2008-2010, <u>Aspire</u>