Requirements Specifications

for

A web-based system for learning Welsh.

Group 1:

'DVT HDH Technologies'

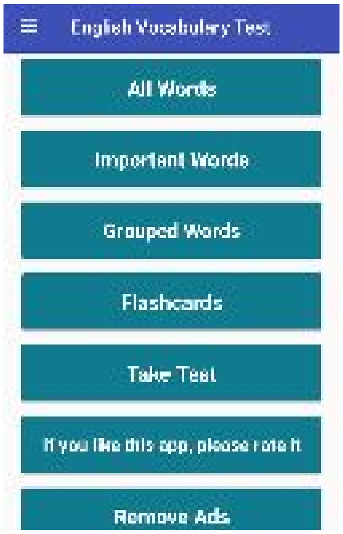
The Team

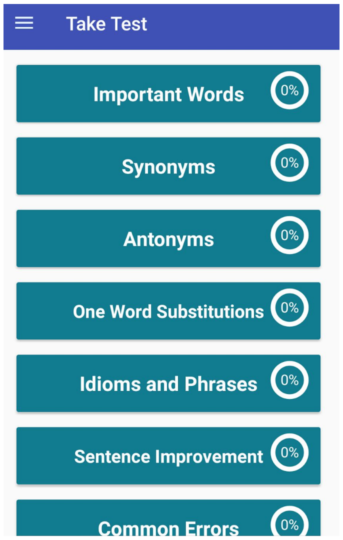
- Vasudha Darbari:
  Project coordinator, Programmer
- Theognosia Hadjiyanni:
  Designer, Documentation
- Dominik Harmim:
  Web site designer, Chief programmer

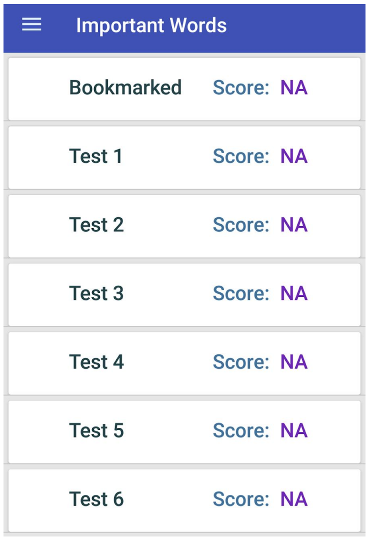
BRIEF INTRODUCTION ABOUT THE APPLICATION

The application is designed to be a Welsh learning tool for english speakers.
The method of teaching is through word translation quiz. For each question one word answer is entered. For every correct answer student gets a point giving them good a practice of this language. With student account user can login and take test and also view score history. A student would not be able to view scores of other users.
Using an Instructor account a teacher , can add or remove words therefore creating and deleting word entries in the word database. An instructor may also view student scores.
Admin can see currently active users and manage the list, admin can also see score database maintained for various test takers.

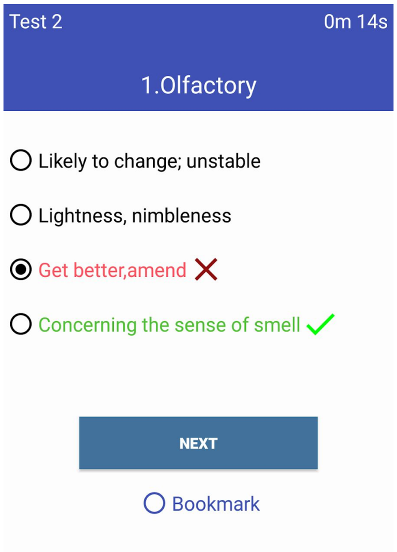
Market Research:






Important Words

Bookmarked	Score: NA
Test 1	Score: NA
Test 2	Score: NA
Test 3	Score: NA
Test 4	Score: NA
Test 5	Score: NA
Test 6	Score: NA


Test 2 0m 14s

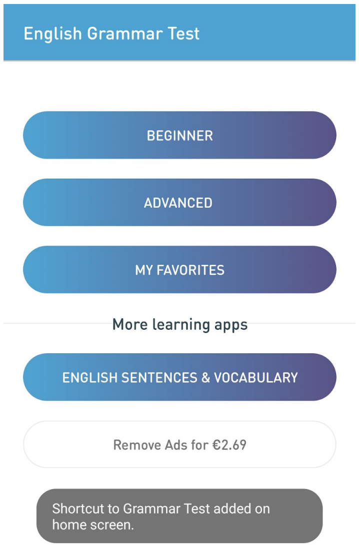
1.Olfactory

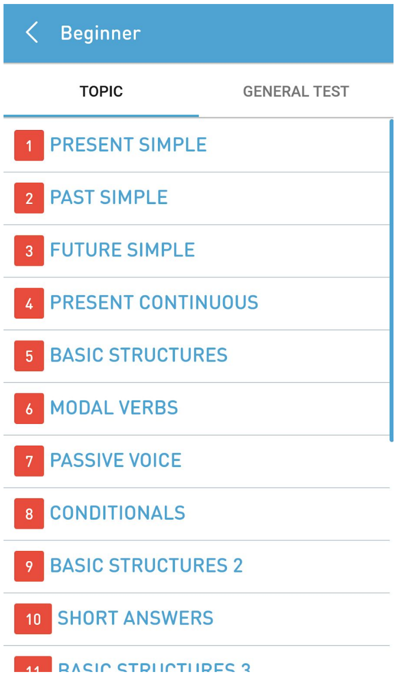
○ Likely to change; unstable

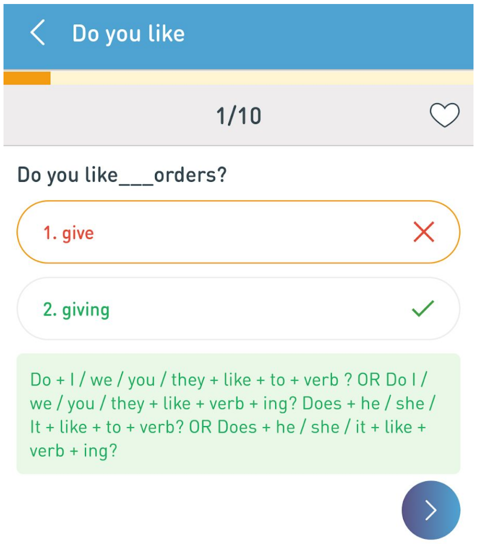
○ Lightness, nimbleness

● Get better,amend ✗

○ Concerning the sense of smell ✓






Do you like

1/10

Do you like___orders?

1. give ✗

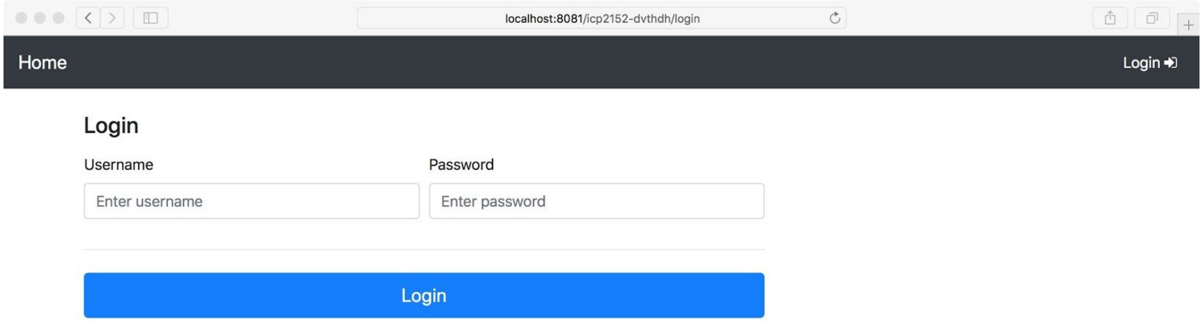
2. giving ✓

Do + I / we / you / they + like + to + verb ? OR Do I / we / you / they + like + verb + ing? Does + he / she / It + like + to + verb? OR Does + he / she / it + like + verb + ing?

Figures 1, 2, 3, 4: Similar Android application “English Vocabulary test”. Highlighted parts: Error identification. Also in Figure 2 the tests have a completion of tests percentage next to them.
Figures 5, 6, 7: Similar Android application “English Grammar test”. Highlighted parts: Colorful with good structure and it would be more interesting to use and go through its’ options, than the first application.

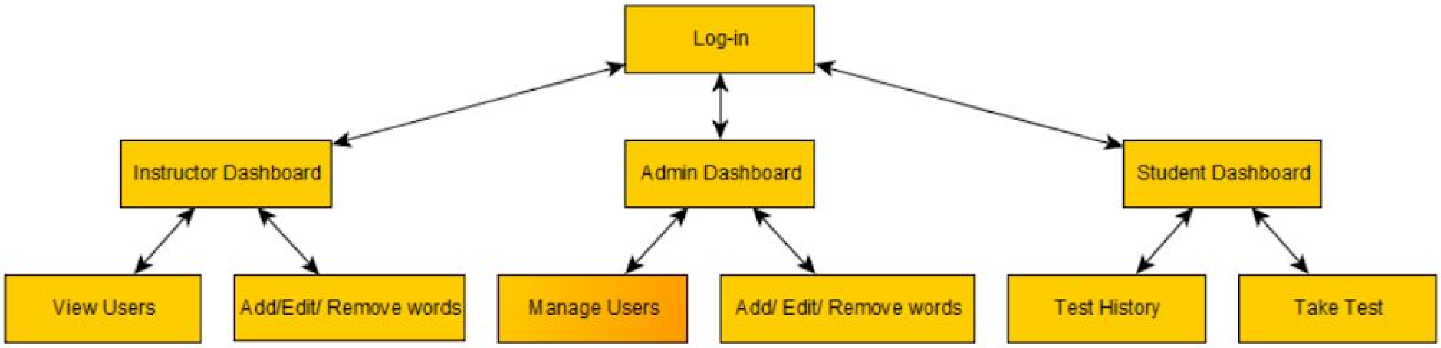
Login and registration Guide

The application has certain features for security.
The password should be minimum 6 characters long to be accepted. At least one of the characters should be a uppercase letter and one a numeric value.
It is advisable that for security reasons you set a password that is not your name or easy to guess. eg: Water2 , Student16



Design

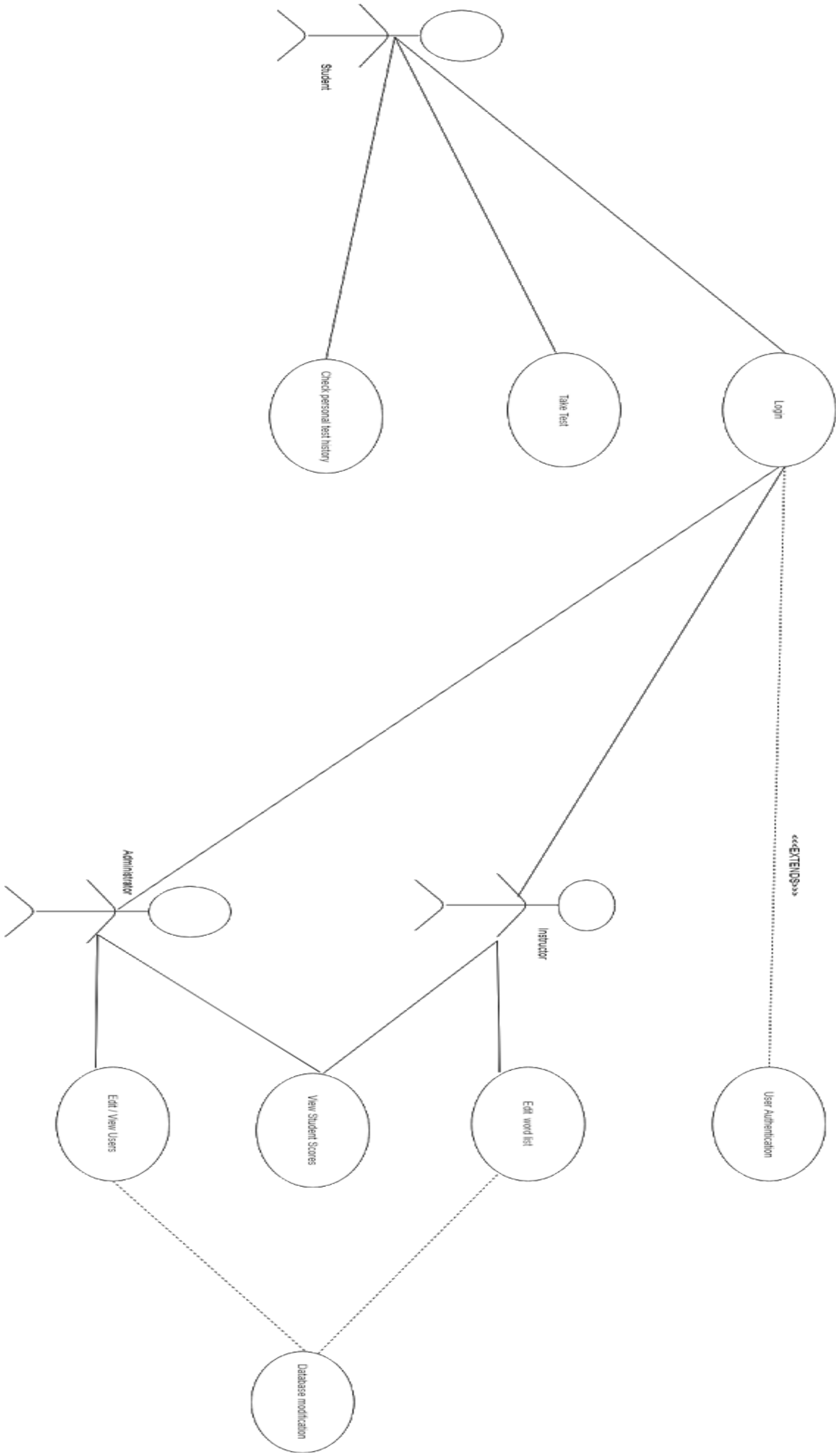
UML Flowchart diagram: showing links between screens



Words case database

ER Diagram

Use Case Diagram



Implementation and Program description

The application has been designed in Java and uses SQL connectivity and servlets and html jsp files.It uses font-awesome for icons and bootstrap and css for styling. The margins and footers and container are built using main.css. Datatables.css styles tables. Validation has been done using javascript for different aspects of application. All the database connections and queries are executed through statements prepared in database.java in folder com.icp2152.dvthdh which megrs sql syntax to get relevant data from the database or update it.

Dependencies used : javax.servlet-api-4.0.0.jar (for servlet), jpcrypt-0.4.jar (password hashing) , jstl (for css) , mysql-connector-java-8.0.11.jar for database connectivity.

The project has an abstract class base servlet that all other servlets implement.

It has methods to check startup which sets character encoding and also to secure the session for each user, access database. It creates an array list of messages for the user with types enumerates in the class. It has method for rendering the jsp to get title, servlet name , basepath , template name and user. It also has method for servlet shutdown and to render service that is methods of a basic servlet like GET and POST.

The first servlet is the Login designed to authenticate the username and password. It puts in use Bcrypt library to secure passwords and validate them. The login form is displayed through login.jsp and is validated against having wrong input types. It updates the user about their login status.

The login page takes the user to their dashboard depending on their role which could be student, administrator or instructor.

The students can click the test button leading them to the Test Servlet. Test Servlet first validates the role of the user as only students can take test. It uses startup() defined in the base servlet to do so. The words are accessed from Word table in database and stored in an object word which is then shuffled with Collections.shuffle(). The words are then cloned into arraylist called randomWords and shuffled. If the size of words (no. of words) is more than private static int NUMBER_OF_WORDS = 20 which is set at program start; then each time it is decremented by one and last position word is removed. An arraylist begins with index 0 and one with 20 objects would be from 0 to 19 we use words.subList(NUMBER_OF_WORDS - 1, words.size() - 1).clear(); The words are then added to questionnaire generated through test.jsp which uses radio type options for answers.

The servlet use try and catch for exceptions.

After test comes FinishedTestServlet to get the score and store it in database. It starts by validating login through startup() method in Base Servlet. It uses an arraylist to store answers. Boolean correct is stored as false to control the score. As the questions are under three categories Gender, English and Welsh it uses three cases. Class matcher instance is used to match input against the database entry. Finishedtest.jsp displays the results to the user with all the questions and if they are correct or incorrect.

A student can view grade history. The template grade-history.jsp displays the scores in form of a table. The data-order attribute has been used and decimals formatted as well.

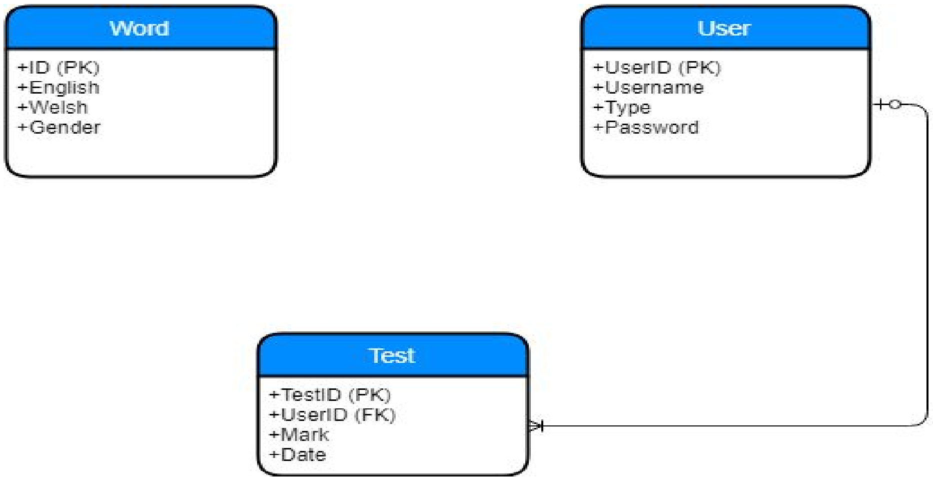
GradeHistoryServlet uses a hashed array list to display the grades. It has database access method to get the row details by user id if user id is valid.

Logout servlet log out the user and redirects them out of the application with startup(). It prints message informing user about log out.
Users with role instructor can view student list and also vocabulary. Vocabulary servlet uses startup() to ensure the user is logged in and also access the database to display values in the word table. Vocabulary.jsp has a button to link to add word page and delete word page.
Addword.jsp make sure that the logged in user has role of instructor or administrator through startup().. Addword.jsp has a small form to take values for welsh , english and gender values for the new word. Addword servlet checks in the login , then uses an arraylist if all the values of the form had been filled out generating new pair in the array list to insert the table word in database where word id is auto incremented. Editword.jsp is a form for editing an entry. Editwordservlet uses startup() to validate login and word id to get details by row , if form was completely filled the values are added to an array list to create a pair and then the database is updated at the given word id. On Clicking the delete button in the login page the delete word servlet uses basic servlet methods for role authentication and ensuring login. It has doGet()_ method to get the parameter word ID and delete it from the database if the word id is valid and then finally redirect to the main vocabulary page. It sends message about status of program if deleted or not.
Functionality of displaying the student list is achieved through student-list.jsp and student list servlet. The users with role of administrator can edit and add users. The dashboard has buttons to display vocabulary and users. The user list is displayed using userlist.jsp which shows results from user table in the database and has the button to edit and delete each entry. However system administrator cannot delete itself. Student list servlet access the database to get the user table entries with role student with doGet(). It implements basic functions like startup(), beforerender(), template(), title() as well.
The add user function has adduser.jsp and adduser servlet. Adduser.jsp is a simple form, the servlet uses basic servlet method that it implements and passes the form values in arraylist to add row to the user database. Edit user function uses edit user.jsp that has form to specify new edited details as per requirement. Edit user servlet gets the parameters entered in the form and the user id of the user selected for editing , after all validation and when no field is null it passes them into an array list finally adding to the database and displaying messages. Delete user function uses Delete word servlet with all methods from base servlets and additional method to get the user id of the user to delete it from database and final redirect it back to the user list page. The vocabulary functions for an administrator are the same through vocabulary servlet and vocabulary.jsp which extends to editing and deleting a word or adding one just like the functions for an instructor.

Description of the DB design

The database consists of three tables: words, user and test. Words store the words in welsh with english translation and gender. User table stores user that can have different roles. Test stores the tests results with date and user Id. The sql files are created using java project. The primary key of all the table is auto incremented and appropriate foreign keys have been added between the entities. There are no multi value columns for the sake of simplicity.

ER DIAGRAM

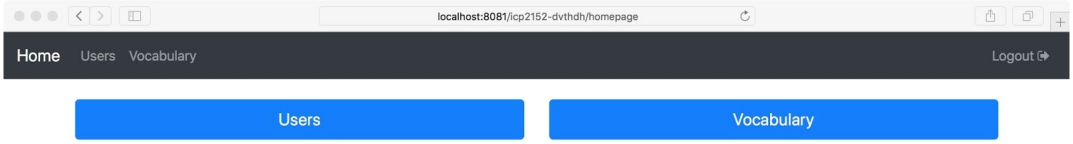


<u>DATA DICTIONARY AND KEY TERMS</u>

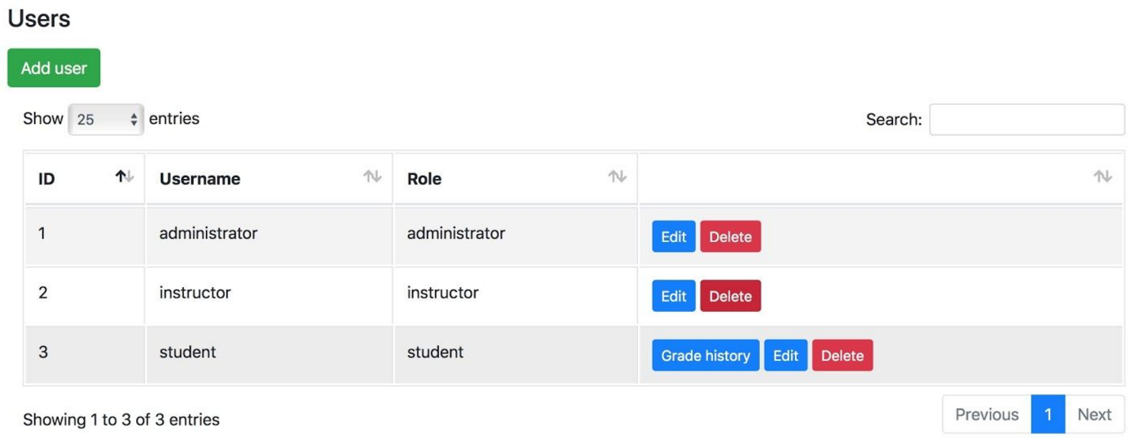
ROLE/TYPE : An user classification for functionality purpose can be Instructor, Administrator and Student.
STUDENT:An user accessing the application for learning purpose allowed to take test and view score history.
INSTRUCTOR: An user accessing the application for teaching purpose. Can access vocabulary list , add , delete and edit words and view student list with grade history
ADMINISTRATOR: User managing the application , can create new users , view user list and also access vocabulary list , add , delete and edit words
ID: Identification number to uniquely identify each row of a table
ENGLISH: The English translation of the specific word
WELSH: The English translation of the specific word
USERNAME: Identification name allotted to a user for login purpose

User Guide

Administrator: will be able to login with his account. His Dashboard will be the first screen that he ll see and it will consist of a 'Users', and a 'Vocabulary' tab, as shown below:



If the administrator clicks on 'Users' he will be able to manage all users. The administrator can edit and delete all users, but also see the grade history of all students. Moreover they can create additional users by clicking the 'Add user' button. There is also a feature were the administrator cannot delete himself from the list displayed.



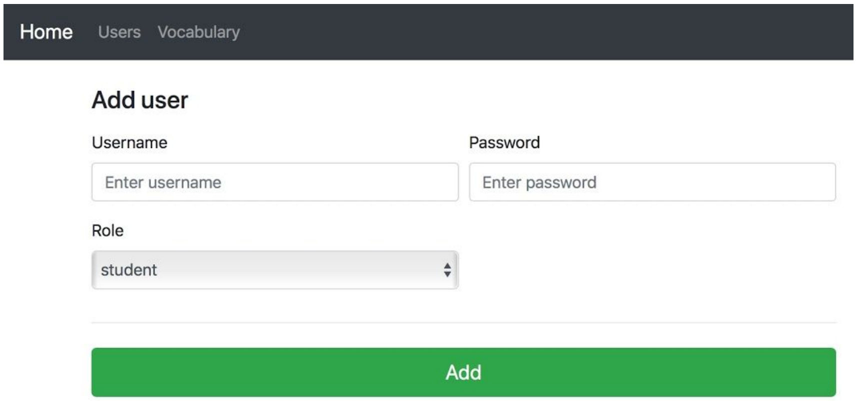
Users

Show 25 entries

Search:

ID	Username	Role	
1	administrator	administrator	Edit Delete
2	instructor	instructor	Edit Delete
3	student	student	Grade history Edit Delete

Showing 1 to 3 of 3 entries



Add user

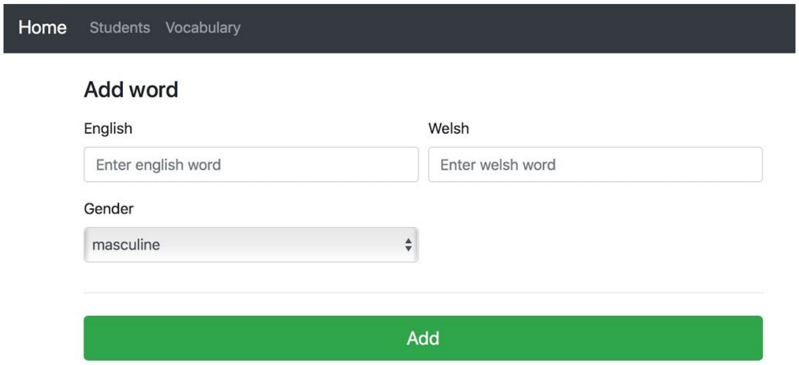
Username: Enter username

Password: Enter password

Role: student

When we select to 'Add user', the screen to the left is displayed. The user's options are to set a username and password but also a role for the new user. When all fields are filled appropriately we can click 'Add'.

By clicking on the top toolbar feature ‘Vocabulary’ as an admin, the user can now view, edit, search, delete and add words to the word list.



Add word

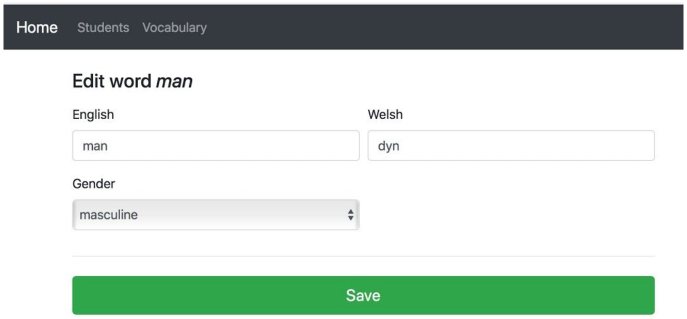
English: Enter english word

Welsh: Enter welsh word

Gender: masculine

When the user selects ‘Add Word’, the following screen is displayed. In this interface the user can specify the word in English, then in Welsh and also set a Gender for the new word. When we ve filled everything we just click add.

Instructor: Will be able to login using his account. The instructors home page will be displayed the same way the administrators home page was displayed, and the user can pick either.
When the ‘Users’ button is clicked the user will be able to view the ‘Users list’ but will not be able to edit or manage them. Furthermore when the ‘Vocabulary’ button is clicked, the user would have the same capabilities as the administrator, by clicking ‘Edit’, ‘Delete’, ‘Search’, and ‘Add word’.



Edit word *man*

English: man

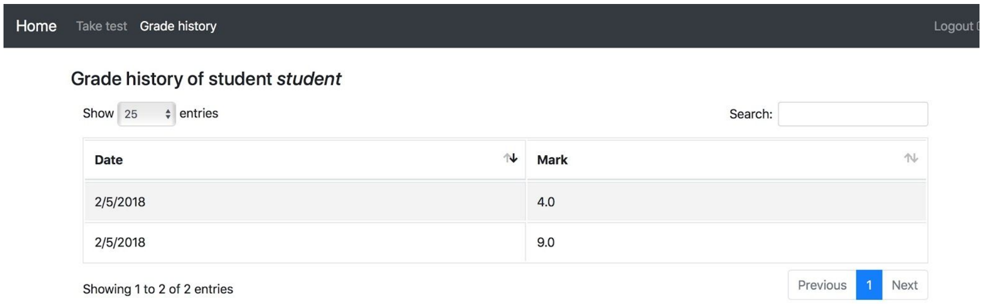
Welsh: dyn

Gender: masculine

When the user wants to edit a word a screen similar to this will be displayed.

Once the user is done with the changes, the ‘Save’ button must be clicked.

Student: will be able to login with his account. The first two features that he ll see will be ‘Take Test’, and ‘Test History’. If we click on Test History the grades from previous tests will appear on a dropdown list.



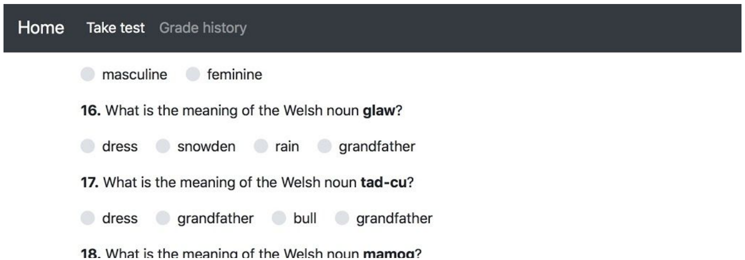
Grade history of student *student*

Show 25 entries

Search:

Date	Mark
2/5/2018	4.0
2/5/2018	9.0

Showing 1 to 2 of 2 entries



○ masculine ○ feminine

16. What is the meaning of the Welsh noun **glaw**?

○ dress ○ snowden ○ rain ○ grandfather

17. What is the meaning of the Welsh noun **tad-cu**?

○ dress ○ grandfather ○ bull ○ grandfather

18. What is the meaning of the Welsh noun **mamog**?

Then we can switch into 'Take Test', and the screen to the right will appear.
Students should go through the test and they must answer in all questions in order to be able to submit.
When that's done the program will either display an error message on whether the user has completed all questions, or a page displaying your wrong and right answers.

Finally, every user can see his homepage components on the top black toolbar and switch from them, but also logout.

Word List

English	**Welsh**	**Gender**
Man	dyn	male
Father	tad	male
Brother	brawd	male
Uncle	ewythr	male
bull	tarw	male
Horse	ceffyl	male
rooster	ceiliog	male
Ram	maharen	male
dog	ci	male
Son	mab	male
Grandfather	tad-cu	male
Christmas	y nadolig	male
Easter	ypasg	male
rain	glaw	male
snow	eira	male
Fire	tan	male
coffee	coffi	male
beer	cwrw	male
Husband	gwr	male
Woman	dynes	female
Daughter	merch	female
Girl	merch	female
mother	mam	female
Cow	buwch	female
Sister	buwch	female
mare	caseg	female
Ewe	mamog	female
Hen	iar	female
Army	byddin	female

Wife	gwraig	female
female teacher	athrawes	female
easter	y pasg	female
oak tree	derwen	female
birch tree	bedwen	female
Snowden	yr wyddfa	female
Dress	ffrog	female
Glove	maneg	female
Nile	river nil	female

Additional Ideas:

- In the test history option we could also add a column where the student could see the words they had in their tests. The student could be able to not only see their marks, but also their mistakes.
- We could also add a feature in which when we close the page sign out accidentally, in the middle of a test, our current score and previous answers won't be affected. You could access this test by simply retaking it.
- Another interesting approach is that the student would be able to go through his current test and correct previous mistakes in previous answers.
- Moreover add pre-created tests and add another option for the student to take a random test. This would be helpful to the student since he can take a test for a second time and learn from their mistakes.

For Security:

- We could add an option where the system would automatically sign you out when you close the page. Moreover if you've finished a test the records will be immediately saved and not deleted.
- We could also count the number of login attempts for the user. Each user should have a specific limit of attempts. If they exit them, they should get a warning message.

INSTALLATION GUIDE

The web application project has been zipped into a Web application resource archive file containing all the a files collection of JAR-files, JavaServer Pages, Java Servlets, Java classes, XML files, tag libraries, static web pages (HTML and related files) and other resources that together constitute it. The war file can be deployed on the web server to run the web application. The war file is icp2152-dvthdh.war.

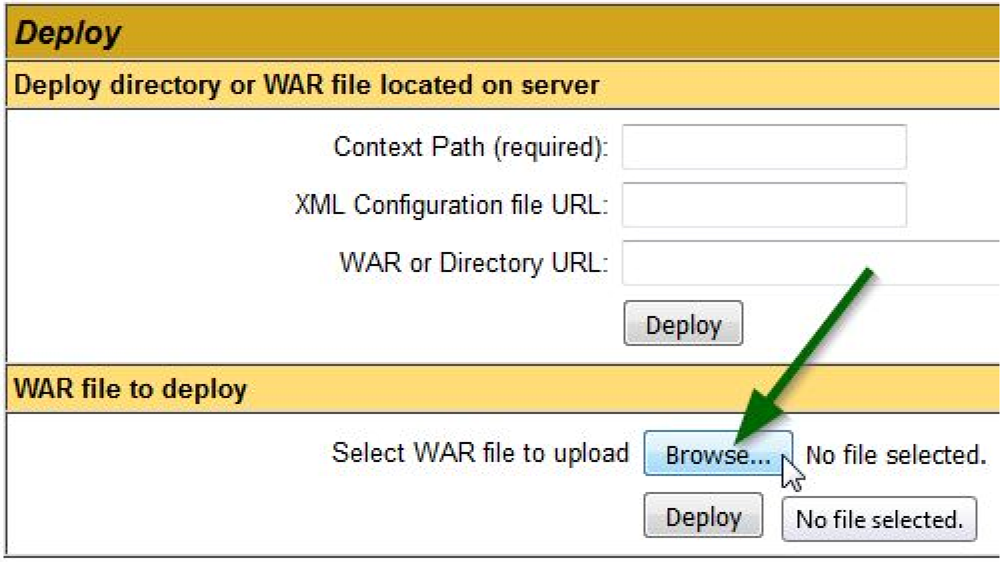
Method 1

Using the UI manager

The manager can be accessed at `http://{host}:{port}/manager/html`
If access denied go to %CATALINA_HOME%\conf\tomcat-users.xml and check that you have enabled a line like this:

```
<user username="tomcat" password="tomcat" roles="tomcat,role1,manager-gui"/>
```

n the **Deploy** section, WAR file to deploy subsection, click on **Browse**



Deploy

Deploy directory or WAR file located on server

Context Path (required):

XML Configuration file URL:

WAR or Directory URL:

WAR file to deploy

Select WAR file to upload

No file selected.

Select the .war file (E.g.: prj.war) > click on **Deploy**

The war file has now been added to the application .

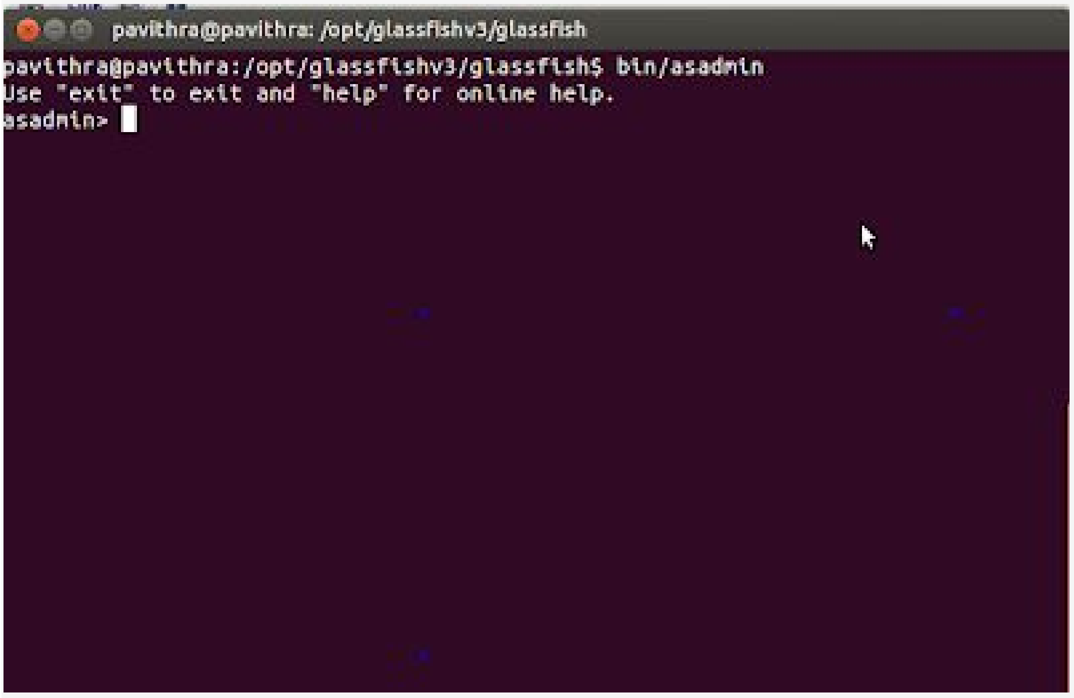
After deploying the war file I can access the project with url :localhost:8081/icp2152-dvthdh/login

GLASS FISH SERVER

Before trying this out make sure you have installed GlassFish in your machine. Installation is just easy as downloading the zip archive from here and unzipping it to a desired location.

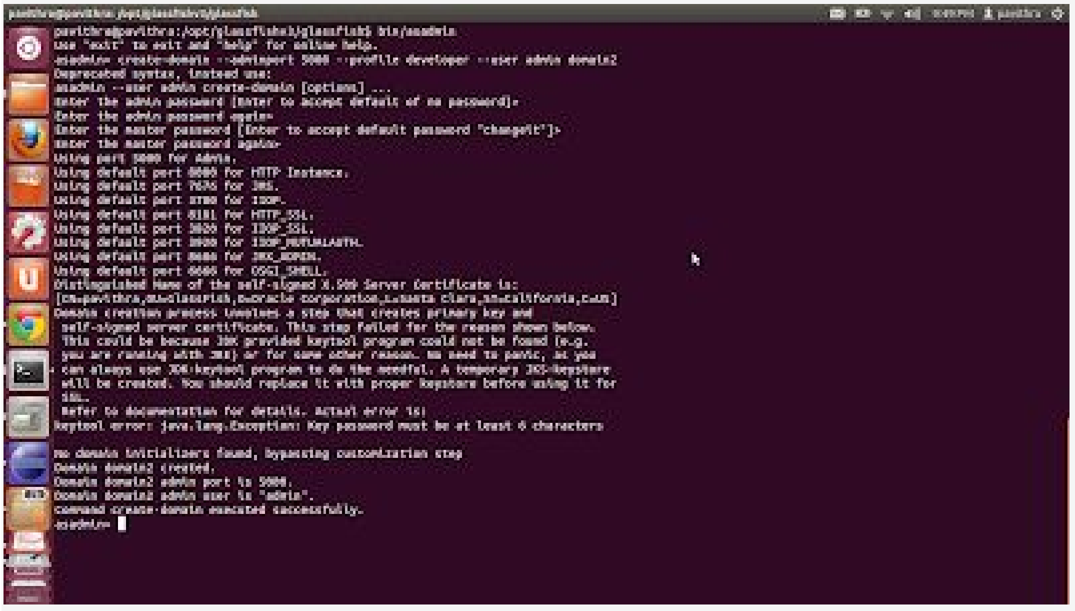
Creating a new domain

Open up a terminal, change directory to the GlassFish installation directory and run following.



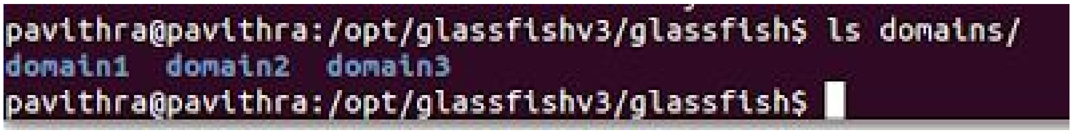
```
pavithra@pavithra:/opt/glassfishv3/glassfish$ bin/asadmin
Use "exit" to exit and "help" for online help.
asadmin>
```

This will enable you to use asadmin tool. Now execute the following command to create a new domain. after running this command you will probably have to give admin password and master password.



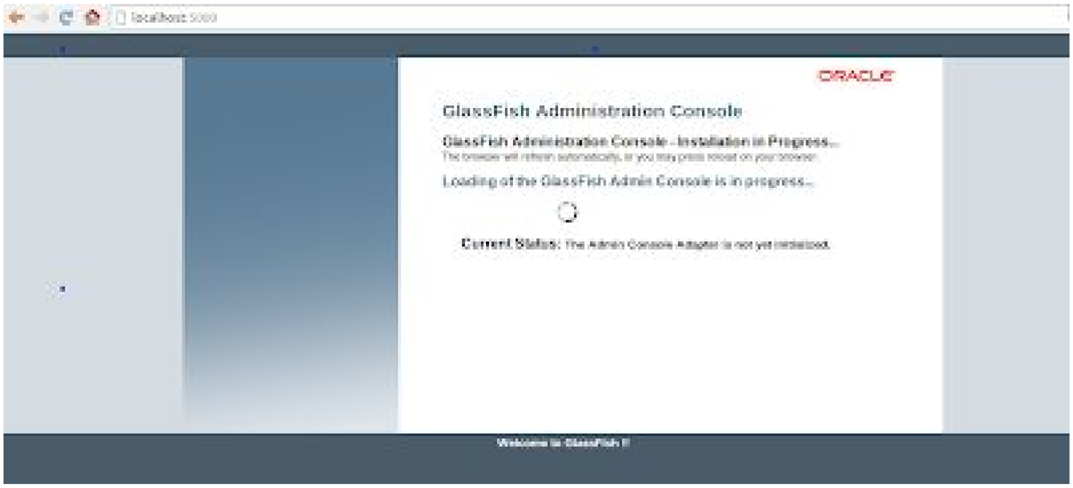
```
pavithra@pavithra:/opt/glassfishv3/glassfish$ bin/asadmin
Use "exit" to exit and "help" for online help.
asadmin> create-domain --adminport 5000 --profile developer --user admin domain2
Deprecated syntax, instead use:
asadmin --user admin create-domain [options] ...
Enter the admin password [Enter to accept default of no password]>
Enter the admin password again>
Enter the master password [Enter to accept default password "changeit"]>
Enter the master password again>
Using port 5000 for Admin.
Using default port 8080 for HTTP Instance.
Using default port 7676 for JMS.
Using default port 3700 for IIOP.
Using default port 8181 for HTTP_SSL.
Using default port 3820 for IIOP_SSL.
Using default port 3920 for IIOP_MUTUALAUTH.
Using default port 8686 for JMX_ADMIN.
Using default port 6666 for OSGI_SHELL.
Distinguished Name of the self-signed X.509 Server Certificate is:
[CN=pavithra,OU=GlassFish,O=Oracle Corporation,L=Santa Clara,ST=California,C=US]
Domain creation process involves a step that creates primary key and
 self-signed server certificate. This step failed for the reason shown below.
 This could be because JDK provided keytool program could not be found (e.g.
 you are running with JRE) or for some other reason. No need to panic, as you
 can always use JDK-keytool program to do the needful. A temporary JKS-keystore
 will be created. You should replace it with proper keystore before using it for
 SSL.
 Refer to documentation for details. Actual error is:
keytool error: java.lang.Exception: Key password must be at least 6 characters

No domain initializers found, bypassing customization step
Domain domain2 created.
Domain domain2 admin port is 5000.
Domain domain2 admin user is "admin".
Command create-domain executed successfully.
asadmin> 
```

Now open up another terminal and change directory to [glassfish-installation]/domains/ and you will see the newly created domain2 has appeared there.



```
pavithra@pavithra:/opt/glassfishv3/glassfish$ ls domains/
domain1  domain2  domain3
pavithra@pavithra:/opt/glassfishv3/glassfish$ 
```

Open up a browser and go to http://localhost:5000/. This will bring you the GlassFish GUI admin console.



GlassFish Administration Console

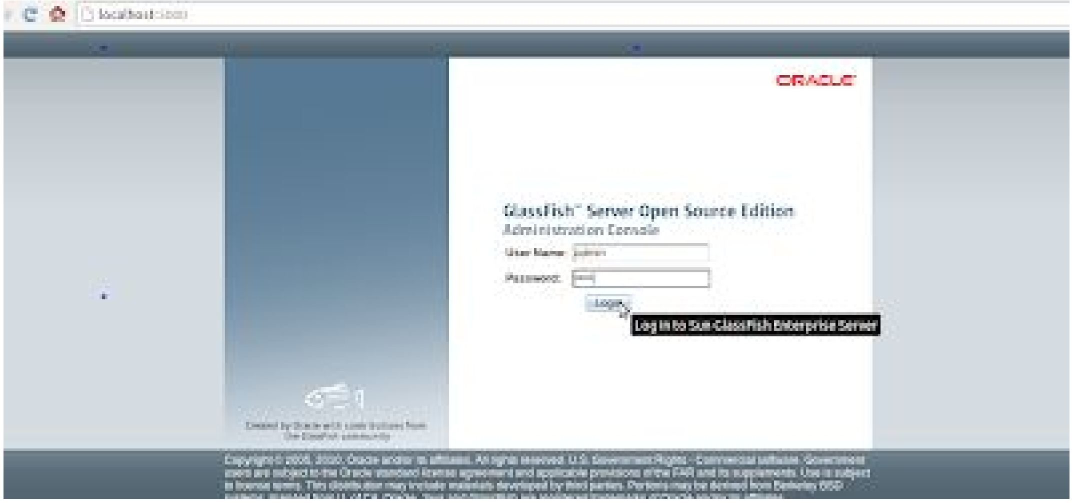
GlassFish Administration Console - Installation in Progress...

The browser will refresh automatically, or you may press reload on your browser

Loading of the GlassFish Admin Console is in progress...

Current Status: The Admin Console Adapter is not yet initialized.

Welcome to GlassFish !!



GlassFish™ Server Open Source Edition
Administration Console

User Name: admin

Password: ••••

Created by Oracle with code from the GlassFish community

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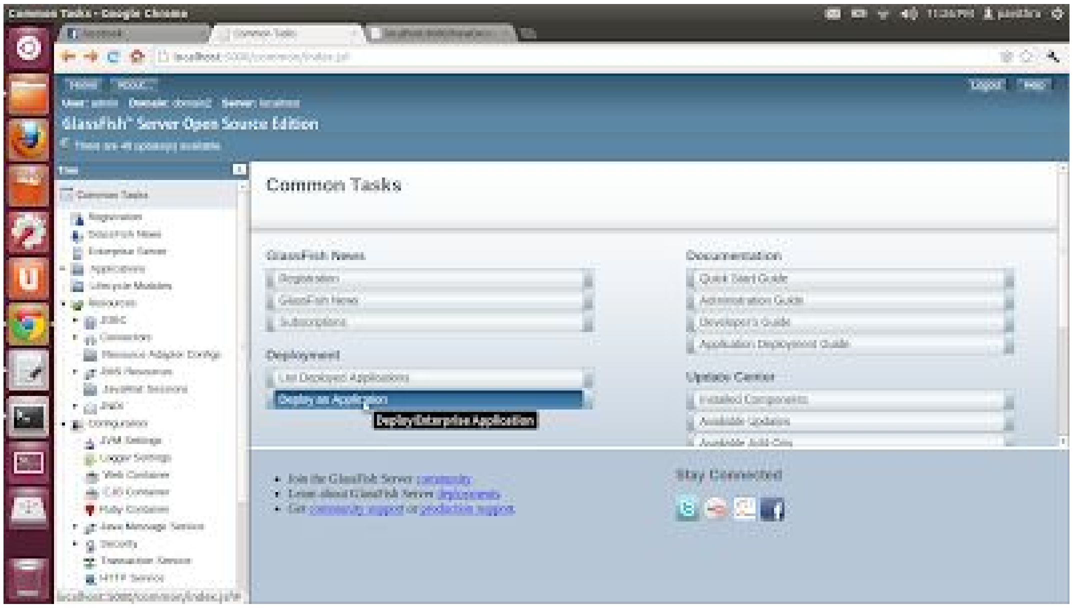


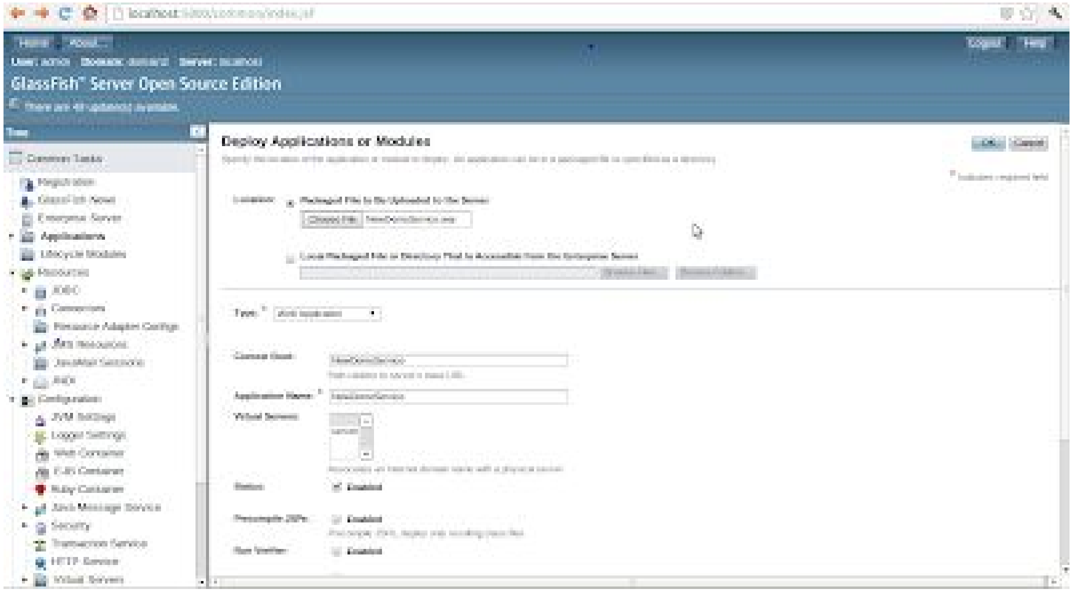
User: admin Domain: domain1 Server: localhost

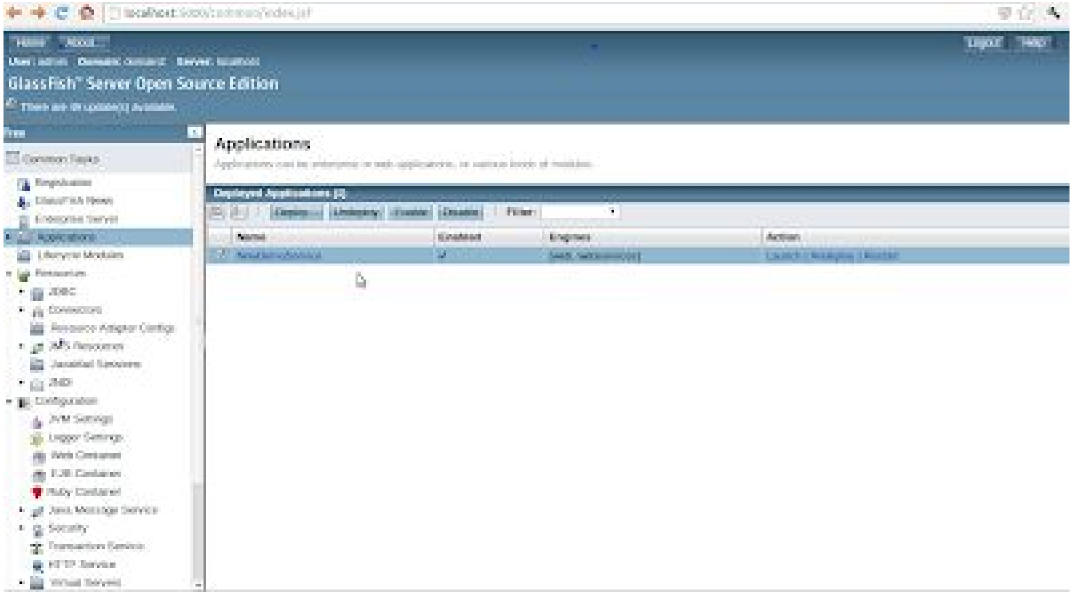
GlassFish™ Server Open Source Edition

There are 48 update(s) available.

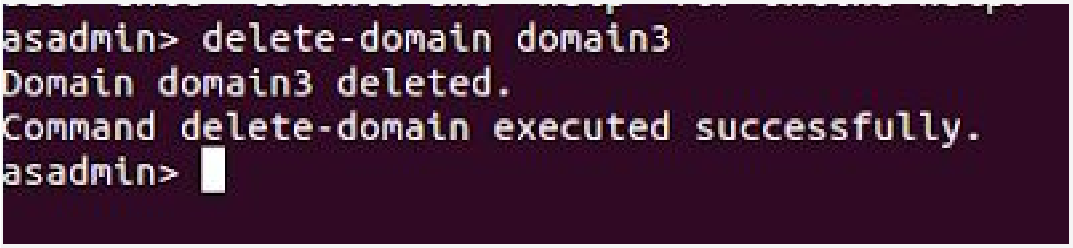
Common Tasks

- Join the GlassFish Server community
- Learn about GlassFish Server deployments
- Get community support or production support





In case you want to delete a domain use the following command.

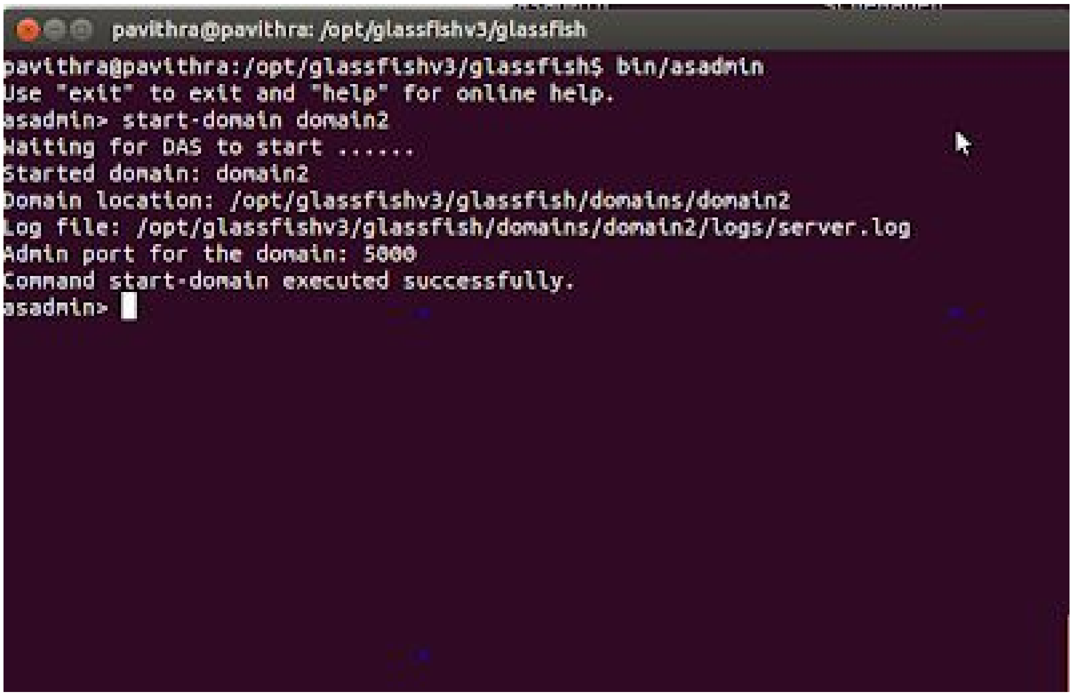


```
asadmin> delete-domain domain3
Domain domain3 deleted.
Command delete-domain executed successfully.
asadmin> █
```

Starting the domain

To start domain2 run following command.

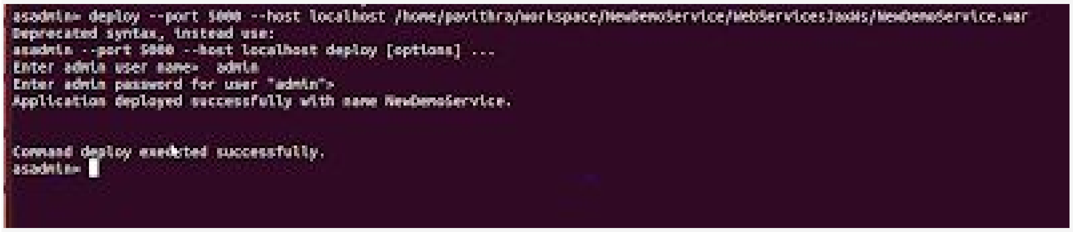
```
start-domain domain2
```



```
pavithra@pavithra:/opt/glassfishv3/glassfish$ bin/asadmin
Use "exit" to exit and "help" for online help.
asadmin> start-domain domain2
Waiting for DAS to start ......
Started domain: domain2
Domain location: /opt/glassfishv3/glassfish/domains/domain2
Log file: /opt/glassfishv3/glassfish/domains/domain2/logs/server.log
Admin port for the domain: 5000
Command start-domain executed successfully.
asadmin>
```

Deploying a war file

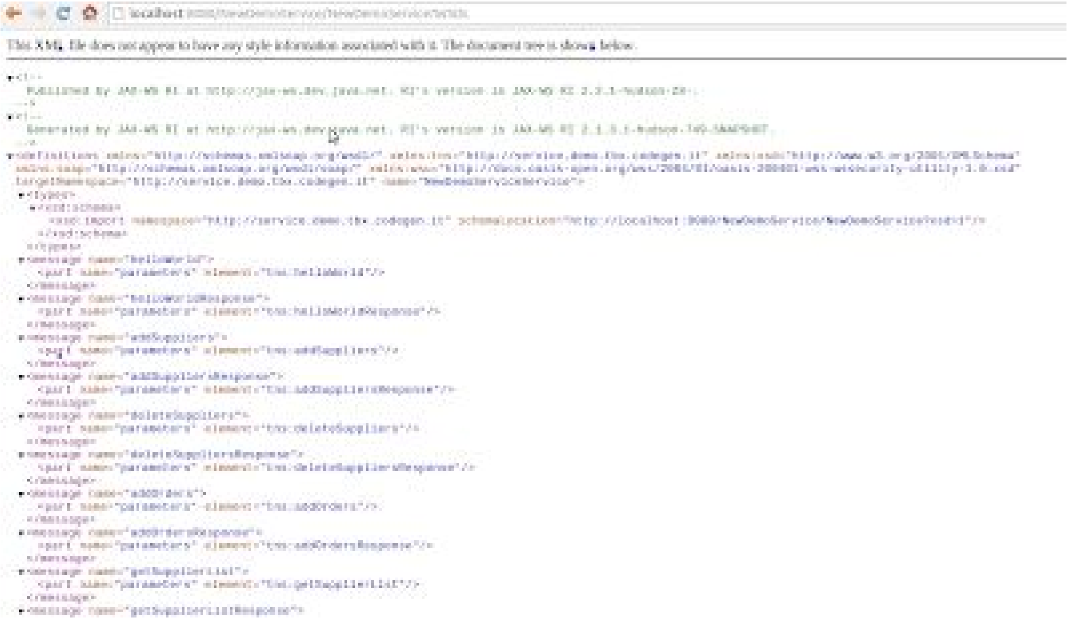
Use the following command to deploy your war file.



```
asadmin> deploy --port 5000 --host localhost /home/pavithra/workspace/NewDemoService/WebServicesJaxWs/NewDemoService.war
Deprecated syntax, instead use:
asadmin --port 5000 --host localhost deploy [options] ...
Enter admin user name> admin
Enter admin password for user "admin">
Application deployed successfully with name NewDemoService.


Command deploy executed successfully.
asadmin>
```

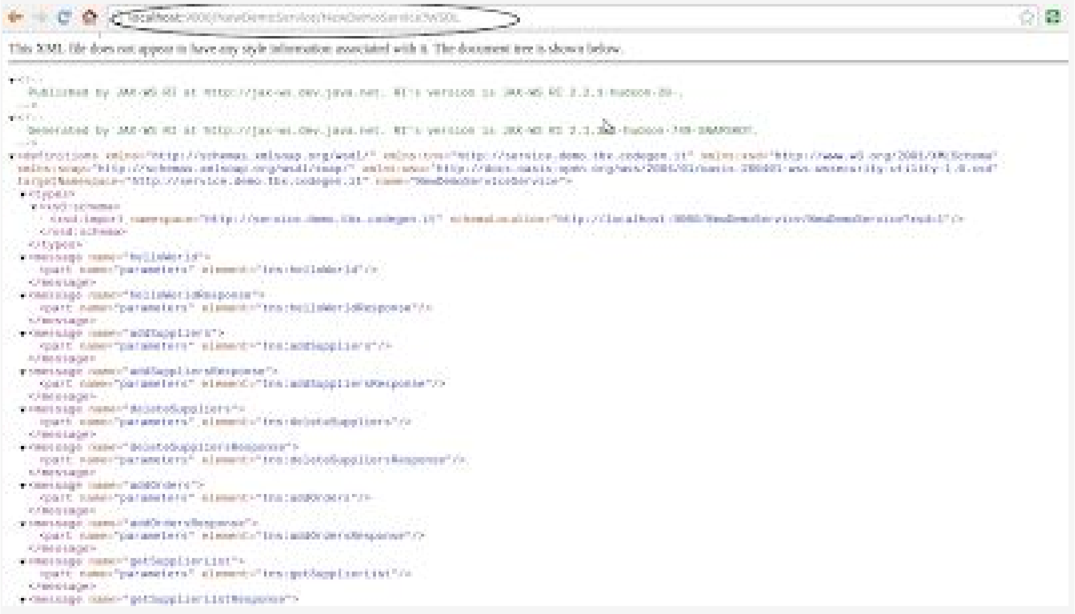
After deploying the war file I can access the project with url :localhost:8081/icp2152-dvthdh/login



localhost:8080/NewDemoService/NewDemoService?WSDL

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
▾<!--
   Published by JAX-WS RI at http://jax-ws.dev.java.net. RI's version is JAX-WS RI 2.2.1-hudson-28-.
 -->
▾<!--
   Generated by JAX-WS RI at http://jax-ws.dev.java.net. RI's version is JAX-WS RI 2.1.3.1-hudson-749-SNAPSHOT.
 -->
▾<definitions xmlns="http://schemas.xmlsoap.org/wsdl/" xmlns:tns="http://service.demo.tbx.codegen.it" xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/" xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-utility-1.0.xsd"
  targetNamespace="http://service.demo.tbx.codegen.it" name="NewDemoServiceService">
 ▾<types>
  ▾<xsd:schema>
     <xsd:import namespace="http://service.demo.tbx.codegen.it" schemaLocation="http://localhost:8080/NewDemoService/NewDemoService?xsd=1"/>
   </xsd:schema>
  </types>
 ▾<message name="helloWorld">
   <part name="parameters" element="tns:helloWorld"/>
  </message>
 ▾<message name="helloWorldResponse">
   <part name="parameters" element="tns:helloWorldResponse"/>
  </message>
 ▾<message name="addSuppliers">
   <part name="parameters" element="tns:addSuppliers"/>
  </message>
 ▾<message name="addSuppliersResponse">
   <part name="parameters" element="tns:addSuppliersResponse"/>
  </message>
 ▾<message name="deleteSuppliers">
   <part name="parameters" element="tns:deleteSuppliers"/>
  </message>
 ▾<message name="deleteSuppliersResponse">
   <part name="parameters" element="tns:deleteSuppliersResponse"/>
  </message>
 ▾<message name="addOrders">
   <part name="parameters" element="tns:addOrders"/>
  </message>
 ▾<message name="addOrdersResponse">
   <part name="parameters" element="tns:addOrdersResponse"/>
  </message>
 ▾<message name="getSupplierList">
   <part name="parameters" element="tns:getSupplierList"/>
  </message>
 ▾<message name="getSupplierListResponse">
```

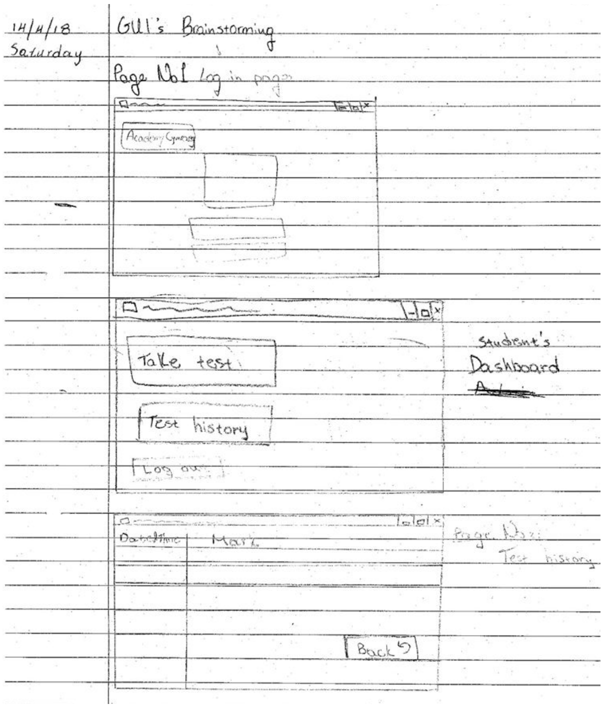


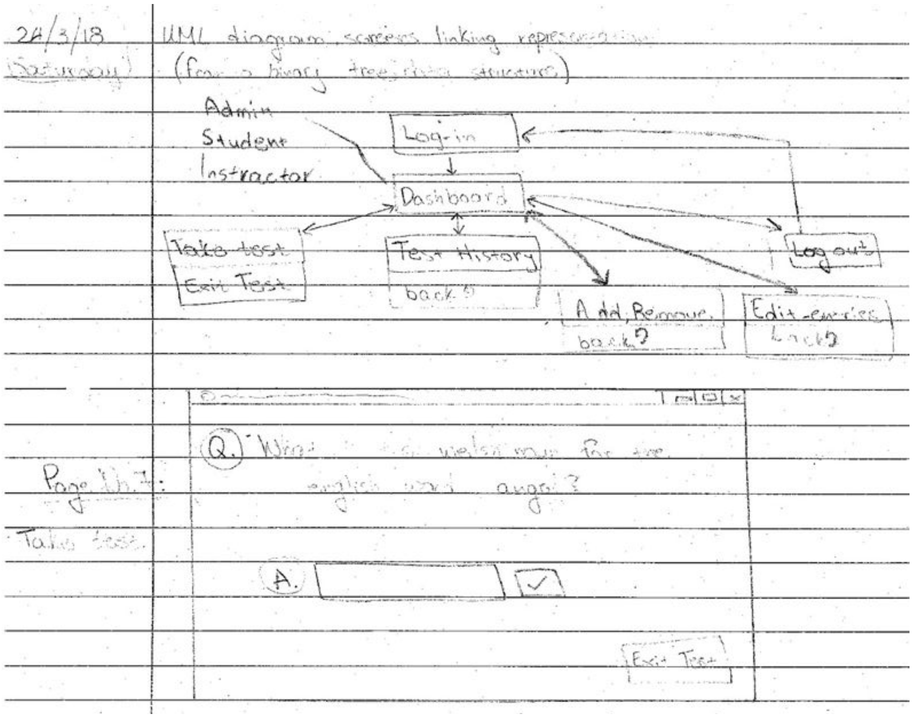
localhost:8080/NewDemoService/NewDemoService?WSDL

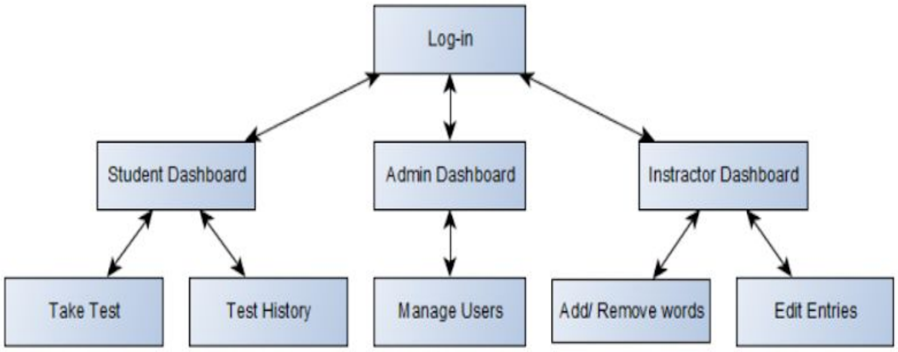
This XML file does not appear to have any style information associated with it. The document tree is shown below.

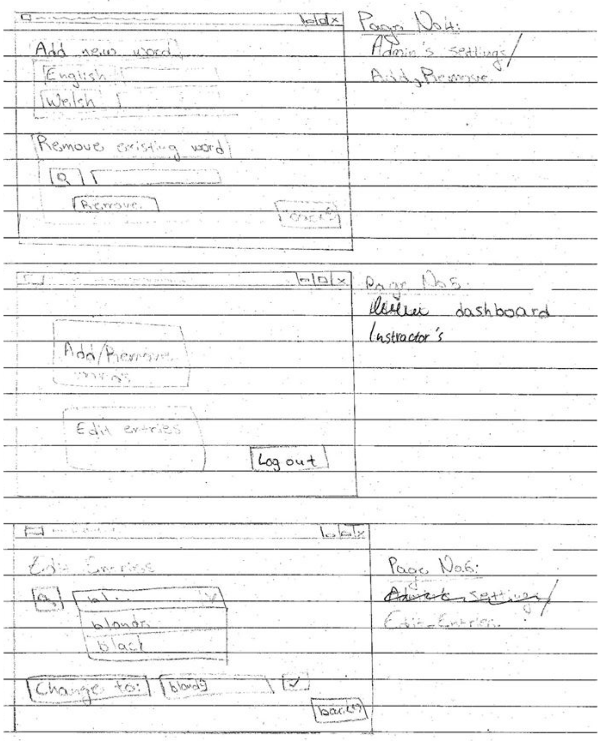
```
▾<!--
   Published by JAX-WS RI at http://jax-ws.dev.java.net. RI's version is JAX-WS RI 2.2.1-hudson-28-.
 -->
▾<!--
   Generated by JAX-WS RI at http://jax-ws.dev.java.net. RI's version is JAX-WS RI 2.1.3.1-hudson-749-SNAPSHOT.
 -->
▾<definitions xmlns="http://schemas.xmlsoap.org/wsdl/" xmlns:tns="http://service.demo.tbx.codegen.it" xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/" xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-utility-1.0.xsd"
  targetNamespace="http://service.demo.tbx.codegen.it" name="NewDemoServiceService">
 ▾<types>
  ▾<xsd:schema>
     <xsd:import namespace="http://service.demo.tbx.codegen.it" schemaLocation="http://localhost:8080/NewDemoService/NewDemoService?xsd=1"/>
   </xsd:schema>
  </types>
 ▾<message name="helloWorld">
   <part name="parameters" element="tns:helloWorld"/>
  </message>
 ▾<message name="helloWorldResponse">
   <part name="parameters" element="tns:helloWorldResponse"/>
  </message>
 ▾<message name="addSuppliers">
   <part name="parameters" element="tns:addSuppliers"/>
  </message>
 ▾<message name="addSuppliersResponse">
   <part name="parameters" element="tns:addSuppliersResponse"/>
  </message>
 ▾<message name="deleteSuppliers">
   <part name="parameters" element="tns:deleteSuppliers"/>
  </message>
 ▾<message name="deleteSuppliersResponse">
   <part name="parameters" element="tns:deleteSuppliersResponse"/>
  </message>
 ▾<message name="addOrders">
   <part name="parameters" element="tns:addOrders"/>
  </message>
 ▾<message name="addOrdersResponse">
   <part name="parameters" element="tns:addOrdersResponse"/>
  </message>
 ▾<message name="getSupplierList">
   <part name="parameters" element="tns:getSupplierList"/>
  </message>
 ▾<message name="getSupplierListResponse">
```

Brainstorming and Prototypes









References and Bibliography

https://appgrooves.com/android/com.praveenj.engtest/english-vocabulary-test/praveen-yuva/
https://play.google.com/store/apps/details?id=com.truatvl.englishgrammartest.dev&hl=en

USER REVIEW

Malak Bukhari:

CIS , 2nd year , Bangor University

i found the design of the software to be easy to use and interact with. I do think that there should be improvements to the software such as: having the correct answer displayed if the user gets one wrong. and it would be really good to have a lesson or like a quick overview of the words that the student is being tested on before entering the test. over all, a very good job! i'm impressed with you 3 developer

Abdulrehman :

CIS , 2nd year , Bangor University

The application is very easy to use but doesn't display the right answer if the answer a student gets is wrong.

Kyle Owen:

CIS , 2nd year , Bangor University

I think the application should have lessons before test for teaching welsh.