**Undergraduate Work Placement Report 2021**

**Title Page**

**School of Computer Science & Information Technology**

**University College Cork**

|  |  |
| --- | --- |
| **Student Name** | Nathan Crowley |
| **Student Number** | 118429092 |
| **Company Name** | Clearstream Global Securities Services Ltd |
| **Workplace Mentor** | Colum O’Riordan |
| **Workplace Mentor Role** | IFS IT Vestima Prime Manager |
| **Workplace Mentor Signature** | XXXXXXXXXXX |
| **Academic Mentor** | Frank Boehme |

**1 Summary**

The Work Placement Programme began on the 22/03/2021 and concluded on the 27/08/2021.The Work Placement took place with Clearstream Global Securities Services Ltd, based in Albert Quay, Co. Cork. Clearstream are a post-trade services provider owned by Deutsche Börse AG.

The work was carried out in the IFS IT Vestima Prime department. The role given was IT intern – developer. The IFS IT Vestima Prime department comprised of 10-12 employees with Colum O’Riordan acting as manager and Martin Allen acting as development manager.

The work week consisted of Vestima Prime daily catch-up meetings at 9.30am, which revolved around the daily tasks of the development team as well as any issues that arose since the most recent catch-up. The work week consisted of 38.75 hours broken down to Monday to Friday usually 9.00am – 5.30pm. The employment period consisted of both large projects as well as small daily tasks. The smaller daily tasks consisted of meetings, training, code fixes, etc. The larger tasks consisted of five projects:

1. SQL JCCS Cutovers with Java & XML implementation.
2. Java Servlet & JSP file uploader to JCCS’s Mr. T.
3. JIRA internal ticketing system tasks.
4. Document Management System research.
5. Proof of Concept regarding Document Management System research.

The Work Placement period allowed for the acquisition of many new skills as well as the enhancement of prior skills. The first two weeks consisted of company structure and business operation presentations. The presentations taught fundamental business terminology such as Mutual funds & Hedge funds, along with their differences and key features. The internal CATS system was demonstrated, and the process of logging hours was shown. The next stage comprised of setup with the Vestima Prime team and internal systems. The daily catch-up process was shown along with being exposed to development cycles, which improved communication skills working with a small development team of 10-12 employees. The months that followed improved technical skills of tools such as Java programming language, SQL, XML, SOAP UI testing, DDL/DML checks for cutovers, JIRA, GitHub commit and pull process, Java Servlet/JSP development, etc.

**2 The Company**

Clearstream Global Securities Services Ltd are a post-trade services provider owned by Deutsche Börse AG. Clearstream provides settlement and custody as well as other related services for securities across all asset classes. Clearstream maintains around 2,500 customers in over 110 countries. The customer base extends over 58 domestic markets, with over 300,000 domestic and internationally traded bonds, equities, and investment funds. Clearstream has offices in Cork, Luxembourg, Prague, and Singapore. The Cork office has some 480 employees in all departments.

Clearstream aims to be a ‘one-stop-shop’ that offers clients both Hedge & Mutual funds operations, offering everything to client as one package. Hedge and Mutual funds are handled separately by Clearstream, Vestima Prime handles the Hedge Funds, with Vestima Plus handling the Mutual Funds. The operational teams are Client team, Trading, Data Management, Corporate Action, Reconciliation & Incident Management, Core Client services, Investment Funds transfer, etc.

Each Clearstream department has a ‘Head of Unit’, followed by a ‘Team Manager’ with sub managers such as ‘Development manager’. The IFS Vestima Prime development comprises of 10-12 employees.

The business flow consists of six steps:

1. Client places an order.
2. Clearstream (CCS) processes the order and creates an ‘Order to Fund’.
3. The Order is Accepted or Rejected by the Fund Administrator.
4. Clearstream informs the client the order has been Accepted or Rejected.
5. Fund Administrator passes a ‘Contract Note’ to Clearstream.
6. Clearstream confirms the details of the ‘Contract Note’ and confirms the order to the client.

Clearstream (“the Custodian”) charges a fee to the clients who have holdings (“a Position”) on the books. Clearstream has a 2020 revenue of €2.936 billion, with net profits of €1.105 billion. With a share price of €149.90 as of 25/08/2021.

**3 My Work Placement**

**Week1:**

The Work Placement Programme began on the 22/03/2021, in the Albert Quay office, with a tour of the office space. Following the tour there was HR presentations on Clearstream’s business operations, fundamental financial terms such as Funds, Mutual/Hedge Funds, Clearstream’s Operational Teams, etc. The presentations improved company knowledge, financial knowledge and gave in sighted into the business. Meetings took place with IFS IT Vestima Prime manager, Colum O’Riordan, and Head of Unit, Peter Carroll. The development team setup process began, this involved downloading and installing internal applications. The ‘SafeNet MoiblePASS’ credentials, used to generate access tokens to the Virtual Desktop (VDI), were created. The VDI is used for internal development of products such as JCCS,etc. The setup process enhanced knowledge of internal terminology such as Virtual Machines (VM’s) referred to as VDI. The first stand-up meeting with the team took place on Wednesday 24/03/2021. The first ‘Friday Fun Quiz’ took place 26/03/2021, this is used to improve team building inside the development team. The first meeting with Martin, development manager, took place on the 26/03/2021. The internal CATS system for logging hours worked was first used.

**Week2:**

The second week began with a Microsoft teams meeting with Colum and Martin. The outline of the 6-month work period was presented. The development team uses Java & Oracle for back-end with React & Angular used on front-end. An email was sent to the University College Cork Academic Mentor as introduction with company and job details. Work continued on the installation & set-up process. A ‘new starters & interns’ meeting took place at 2.30pm 01/04/2021. This week presented the knowledge of Jboss servers and how to download & install. More meetings took place with the development manger. There was a presentation on Clearstream’s business operations along with information on common clients of the business. The Cork Clearstream office mainly operates in Hedge Fund post trade services, with emphasis on the transfer of securities. The presentation showcased the operations of JCCS looking at both front-end and back-end. A flow-diagram was shown demonstrating Clearstream’s business model and taught how the company works and the different inner process.

**Week3:**

The third week commenced with ‘Stock Market’ presentation at 3pm on 06/04/2021. The presentation covered information on Clearstream’s parent company, Deutsche Boerse Group (DGB), along with financial terminology. Deutsche Boerse Group is one of the largest finanical operators in the world, with over 9,000 employees as of 2021, offering a diverse set of servies such as ‘Pre-IPO’, ‘Trading’, ‘Post-Trade’, etc with the Post-Trade services offered by Clearstream. Daily stand-up meetins with the development team continued. Meeting took place with development manager on 08/04/2021 regaring cutovers. Cutover is a change of data in the database. Oracle SQL developer was demonstrated and how to create SQL cutover scripts. Improved communication skills participating in the weekly quiz.

**Week4:**

The fourth week compromised of SQL cutover development. First task was to create SQL script to update the database ‘LK\_EMAIL\_TEMPLATES’ of automated internal emails. The requirement was to add to each automated email a placeholder for confidential text, such as [ConfidentialText]. Next was to update JCCS Java & and XML code. The Java code is used to retieve a string from the XML and replace the placeholder with a given string. Getters and Setters were created inside the Java code as well as adding @BeanPropertySetters to link the XML. Performed DDL/DML checks using SOAP UI to test the cutovers had not altered other developers code. Transaction elecments were added to the SQL script, only allowing data change when cutover is fully executed. Imporved knowledge of cutovers and how to create SQL scripts inside Oracle developer. How to execute cutover script eeffectivley and not interupt other development work.

**My Work Placement**

**Week 5 – 8**

**Week 5:**

The second month of work placement began on 19/04/2021. Following the cutover task being completed, the process for commiting to ‘Dev’ remote repository uisng GitHub push & shelf. GitHub shelf creates a local commit with your changes, along with the commit message ‘SHELF’. Continued daily stand-ups with the devleopment team. The SQL cutover scripts along with Java & XML changes to JCCS were commited to ‘Dev’. There was a #300 error message during the process of running the cutovers. The #300 error message was solved with instructions inside the ‘readme\_DBPrepSteps.txt’ inside ‘/local/jccsbin/JCCS\_CUTOVER’. Tasked with arranging and generating a general knowledge quiz for the team’s weekly Friday fun. The weekly quiz is a good interaction with the team and great way to get involved virutally with team members.

**Week 6:**

Following the completion of the cutover tasks, a meeting was set up with the development mangaer regaring the next project to be completed. Research was completed on how Mr. T (MessageTransformationEngine) fits into the overall business structure. Mr.T is a internal component of JCCS. The new task was to create a Java JSP/Servlet file uploader to a desired folder destination inside Mr.T. To create a JSP/HTML form that allows the devleopemnt team to drop files directly into Mr.T speeding up the production process. A response was sent to the user to confirm their file had been uploaded to the destination. The task introducted the concepts of Java JSP’s & servlets. The File Uplaod task began on local repostiory. Tested File Upload locally with a set local test folder to ensure files were not corrupted and transmitted correctly. The code was deployed to JCCS lcoalhost Jboss server to be tested.

**Week 7:**

Began the development of the Java Servlet for handling the file uplaod processing. The task envoled getting user file input through a JSP form, process the file with Java Servlet, upload file to desired location inside MR.T, show output message to users. The Servlet file ‘FileUploadAction.java’ was added to ‘CCSEngineWAR/java/web/fileUpload’. The JSP file ‘file-upload.jsp’ was added to ‘CCSEngineWAR/webapp/WEB-INF/content/web/fileUpload’. WAR files are files used to distriubte a colleciton of Java JAR-files.

The JSP method was set to POST, the enctype set to ‘multipart/form-data’, the action set to ‘/fileupload/\*/’. This enhanced HTML sytanx. Key component for completing the task was to ensure that the JSP action and Servlet URL were mapped to the same value. The CCSEnigineEAR file was redeployed to JCCS. Tested the components with a JCCS link to the code. The week concluded with the Friday Fun Quiz and the task of researching futher JSP’s & Servlet’s.

**Week 8:**

**My Work Placement**

**Week 9 - 12**

**Week9:**

**Week10:**

**Week11:**

**Week12:**

**My Work Placement**

**Week 13 - 16**

**Week13:**

**Week14:**

**Week15:**

**Week16:**

**My Work Placement**

**Week 17 - 20**

**Week17:**

**Week18:**

**Week19:**

**Week20:**

**My Work Placement**

**Week 21 - 23**

**Week21:**

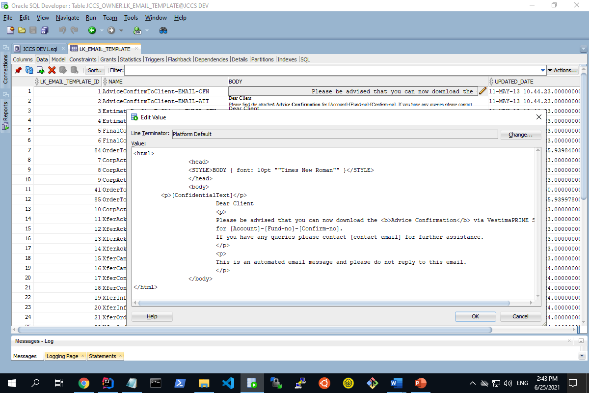
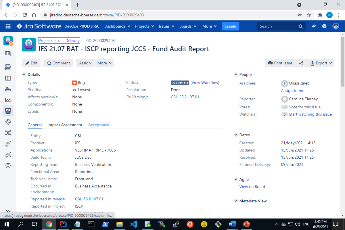
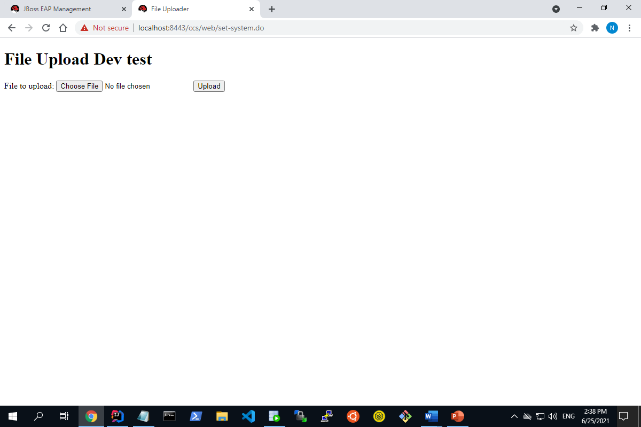
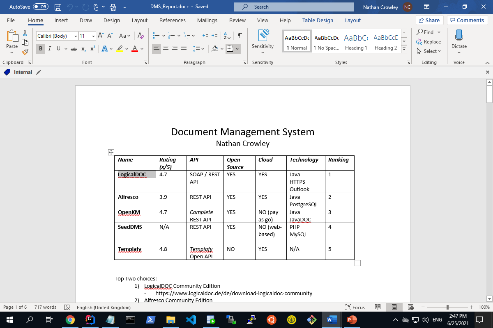
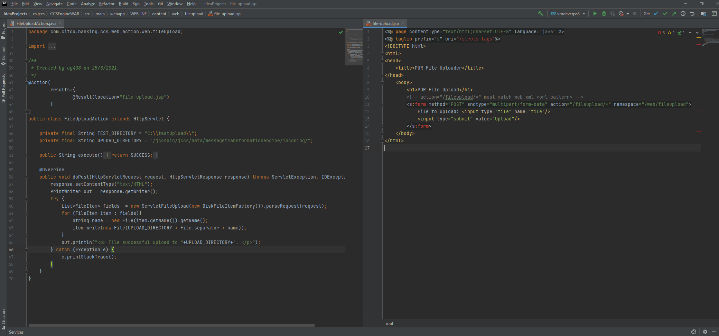
**Week22:**

**Week23:**

**Appraisal of the Placement Module**

**The Administration of the 2021 Program**

**Appendix**



- what is JCCS

- What is ccs

**References**

<https://www.deutsche-boerse.com/dbg-en/investor-relations/financial-reports/annual-reports/annual-report-2019>.

<https://www.clearstream.com/clearstream-en/about-clearstream>.

<https://en.wikipedia.org/wiki/Clearstream>.