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| **Assignment Title** | **Enterprise Integration Using Integration Middleware** | |
| **Team Size** | **5-6 persons**  **Form during class in week 9.** | |
| **Percentage of Overall assessment** | **30%** | |
| **Due Date** | **Proposal** | **Week 10**  By **Thursday 2359hrs,** you must schedule an appointment with your respective instructor for a 20-mins consultation.  Be sure to schedule your consultation after you have completed the “Data Transformation” and the “Putting it all together” labs.  **Week 11**   1. Before your consultation with your instructor,    1. Prepare 2-page proposal document and meet your respective instructor (20mins consultation). This is not graded but you must bring this proposal when discussing with your instructor. You do not need to submit this document.    2. Be prepared with questions and analysis prior to the consultation. |
| **Final Deliverables** | **Submission deadline for your deliverables are on week 13. Presentation is during the class time. The deadline for all artefacts is at 30 minutes before the start of your respective classes;**  **E.g.,**  **0815 class : 0745hrs**  **1530 class : 1500hrs**  **(Note: By default, we will mark the latest submission and apply penalties for late submissions.)**  **See deliverables section for details.** |
| **Final Deliverables** | * **Presentation component** **(18 marks)**:   1. Presentation slides   2. In-class presentation / demonstration of your scenario and technical solution (12 minutes presentation/demo followed by Q&A) * **Documentation and Executable (12 marks)**   1. A final report   Your report must include:   1. Scenario and technical implementation (max 6 pages, see report deliverable for details of what should be included) 2. Walkthrough of your demonstration using screen captures (max 10 pages)    1. Code/Scripts/Exported TIBCO Project   Short write-up of how to run your scenario with your submitted code/scripts/exported TIBCO project, etc.  The code/scripts/project are not explicitly graded; they are used to verify against your solution as described in report if required.  For all deliverables, see below section on Requirements for more information.  **Note**: Manage your resources carefully, i.e., you will not be allowed to present beyond 12 minutes regardless of whether you have finished your demo/presentation; any pages in your report that is beyond the page limit will not be marked. | |
| **Intra-Team Issues** | Since there is no intra-team peer-evaluation we will investigate on a **CASE-BY-CASE** basis and make appropriate decisions on penalties to the member(s) who did not do their part for the project. However, note the following point:  If there is any issue(s) within the team, you **MUST** let us know the problem(s) **AS AND WHEN** the problem(s) surfaces. If you have issues that persisted throughout the project and inform us about it only at the end of the project, we are afraid that there is **really not much we can do at that stage!** | |

**Marking scheme**

Here are some (but not restricted to) of the criteria that may determine your grade:

**(1) In Class-Presentation with Demo**

* Is the scenario clearly explained?
* Is there smooth flow of the ideas throughout the presentation?
* Are the slides well designed and clearly readable?
* Is the presentation well-paced?
* Are there sufficient details provided in the presentation to help audience understand the technical diagram and process flow?
* Does the demo clearly demonstrate the scenario discussed?
* Does the demo work without any hiccups?
* Are the user interactions and system responses clearly visible?
* Was the team able to answer questions asked by the audience?
* Did the presentation demonstrate the team’s understanding of various integration concepts?

**Technical Depth**

* Have the minimum technical requirements as per the assignment description been fulfilled?
* Are there any technical aspects that went beyond the labs?
* How relevant are the technical implementations for the scenario?
* How complex are the technical implementations (including those beyond the labs)?

Rubrics

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| **Marks** | **Details** |
| <10 | Presentation with Demo sloppy. Bare minimum technical depth. |
| 10-12 | Presentation with Demo is of reasonable standard. Reasonable technical depth |
| >12-14 | Presentation with Demo is good. Good technical depth. |
| >14-16 | Presentation with Demo is very good. Very good technical depth. |
| >16 | Presentation with Demo is exceptional. Exceptional technical depth. |

**(2) Report**

* Is the report well structured (including professionalism)?
* Does the report explain clearly the scenario?
* Does the report clearly describe the technical implementation?
* Are there discrepancies between the different sections of the report?
* Are the diagrams clear and consistent with the scenario and technical implementation?
* Are the technical aspects that go beyond the labs clearly explained in the report?
* Are the terminologies used in the report correct?

Rubrics

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| **Marks** | **Details** |
| <7 | Report is sloppy. |
| 7-8 | Report is of reasonable standard. |
| >8-9 | Report is good. |
| >9-10 | Report is very good. |
| >10 | Report is exceptional. |

In addition we will take the following into consideration:

* Punctuality in submission on week 13
* Results of inter-team peer evaluation (in-class exercise on week 13)
* Results of Intra-team evaluation if there is any team issues being raised

**Note:**

Marks will be deducted for (also see section on submission)

* Late submission
* Poor inter team peer evaluation (such as low points and feedbacks from teams evaluating you)
* Poor intra team peer evaluation (if applicable)

**Learning Outcomes**

This assignment will contribute towards the following learning outcomes:

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| **Learning Outcome** | **Sub-Skills** | **Comment** |
| **Integration of business and technology in a sector context** | 1. Business IT value linkage skills 2. Ability to understand & analyze the linkages between: 3. Business Processes or Technology Strategy and IT Solution | Understand the importance of business processes and how IT supports the automation of the processes. |
| **IT architecture, design and development skills** | 1. Software and IT architecture analysis and Design skills 2. Implementation skills 3. Technology Application skills | * Analyze integration requirements for given scenario and design the solution. * Implement integration solution using various technologies. * Apply appropriate technology to solve integration problems. |
| **Learning-to-learn skills** | 1. Search skills   Ability to:   1. Search for information efficiently and effectively 2. Learning Methodology skills   Ability to:   1. Develop learning heuristics in order to acquire new knowledge skills (focus on HOW to learn versus WHAT to learn) | Ability to search relevant information with reference to the chosen scenario. The assignment requires the students to search for relevant information in the domain in order to make appropriate assumptions, identify suitable applications, locate or build web services to use, etc. |
| **Collaboration (or team) skills** | 1. Skills to improve the effectiveness of group processes and work products   Ability to develop:   1. Communication skills 2. Consensus and conflict resolution skills | Ability to effectively demonstrate teamwork and resolve conflicts in designing and implementing the scenario and the IT applications |
| **Communication skills** | 1. Presentation skills 2. Provide an effective and efficient presentation on a specified topic | Ability to identify the required content that will be presented to demonstrate the scenario. |

**IS301 Assignment 2: Enterprise Integration Using Integration Middleware**

An Integration Middleware (IM) is a middleware that provides functionalities for integrating disparate IT applications in an organization. The IM provides capability for integrating applications that communicate using various protocols such as JMS, HTTP, JDBC, SOAP, JRMI, CORBA. In addition it provides a means for transforming data from one format to another, routing of data based on content and also for defining and executing a scenario that defines the logic to control the flow of information between the applications. The Business Documents used in the integration are usually defined in XML and manipulated using XPATH and XQUERY.

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In this assignment, your team must come up with a scenario that uses a business process to control the flow of information between a numbers of IT systems. The following are some examples of business processes that your scenario can be based on:

* Order-to-cash Process
* Procurement Process
* Student Admissions Process
* Housing Loan Process
* New Credit Card Application Process

You must implement the scenario with appropriate use of **Integration Middleware** to illustrate your scenario. The process **MUST** be implemented using **TIBCO BusinessWorks**.

Your scenario should satisfy the following requirements

**Requirements**

* You must show integration across **at least 2 machines** (representing different IT systems in your scenario), **maximum of 4 machines**. You can also show more than one IT system running on a machine. For the demo in the class, it is highly recommended that you run all your IT systems on **2** **machines**. The reason being that, each machine will be connected to one projector. Hence, the maximum number of machines you can project is two.
* The scenario must include integration using at least **1 JMS** **interaction** and at least **2 web services** (see web services requirements below)
* Web services requirements:
  + You must **code and host at least one** of the web services
  + You can either:
    - Write Java code and use Axis2 to expose the web service (such as the ExchangeRate web service) OR
    - Use TIBCO Designer to create a web service (such as the RouteOrder service in “Put Everything Together” lab) OR
    - Use any other way you know to create a web service (such as using .NET)
  + Should you decide to host only one web-service (no restriction on whether it is SOAP-based or RESTful), you can use any available web services on the Internet for the other web services. See “Web Services Resources” for example sites where you can find some web services.
* You must show at least **1 data transformation**. This data transformation must involve structural change in the data format between the systems, an example of such a data transformation is found in the “Data Transformation” lab. (Note: Data manipulations are also data transformations but they should not count towards the data transformation requirement.)
* You must show at least **1 content-based routing** in your scenario; an example of the content-based routing is found in the “Putting it all together” lab.
* Data transformation and content-based routing requirements must be done using the IM for at least one instance. If you have more instances, the other instances can be done in the other systems.
* You must have at least **1 database implementation**, regardless of whether it is accessed from the IM (for routing or transformation purposes) or by the systems (e.g. inventory database). Note that your IM should not own any business database. By business database, it means that for e.g., if there is a Patient Database that is managed by a Patient Management System, the Patient Database should not be owned by the IM.
* You must have at least **2** types of **documents** that are defined in **XML** (you need at least 2 different XSDs).
* You MUST have at least 1 technical aspect that goes beyond the labs (see section “**Some examples of going beyond labs**” for examples)

**Deliverables**

* **Proposal** -- You must prepare a proposal as per the deadline stated above. We recommend that you set up the session **as soon as you are ready but after the “Data Transformation” and the “Putting it all together” labs, as this assignment requires background understanding from these labs.** Meeting us early allows you to have ample time to implement. Plan for a time where all the members of the team can be present for the session. The content of the proposal document should include
* A diagram and description of your scenario
* Statements/description of where and how you would use the JMS queue/topic, web services and XML documents in the context of your scenario. Design and content of JMS messages and XML documents are not required at this stage.
* Statements/description of where and how data transformation and content-based routing are required in the context of your scenario.

You are **not required** to submit the proposal but you must present the proposal to your instructor as you meet with him/her for the **20-minute** discussion session. The proposal document and the session is an opportunity for you to review with your instructor to get a sense of your analysis and views of the project. Your scenario can still be changed or refined after this consultation.

* **Presentation**
* You must submit your Presentation slides (**in MS PowerPoint format**).
* You must describe the scenario you have chosen
* You must show appropriate use of the EI concepts such as XML, content-based routing, data transformation, and web services during your presentation.
* You must reserve ample time for demonstration of your solution
* You must have at least 1 slide on what your team has done beyond what is covered in the labs
* A Q&A session will follow each presentation. Every member of your team should be prepared to answer questions from all persons watching your presentation/demonstration, including your classmates and your instructors.
* **Report**
* You must submit a final report (**in MS Word format**); content of the report must include (but not restricted to)

1. Write-up of the scenario
2. Write-up of the various technologies that you have selected (JMS, Web Services, XML documents, databases, etc.) to integrate various systems in your scenario, support with and technical diagram and explanations of why each technology is selected in the solution
3. Design and content of the data used in your scenario
4. How you have used the IM, i.e., details for data transformation, content-based routing, invocation of web services and other integration related features configured in IM
5. Description of the process(es) from your IM to give a glimpse of what goes on within those process(es).
6. Walkthrough of your demonstration using screen captures. Screens captured must be viewable when the document is displayed at 100% zoom scale.

Point (i) to (v) has page limit of 6 pages (excluding cover page) and point (vi) has page limit of 10 pages.

* Your report must be presented in coherent way and include IT perspective of your overall design.
* **Executable**
* You must submit all of the code, batch scripts and exported TIBCO project(s) for your scenario.
* You must also write a readme file giving instructions on how to run your scenario with your submitted code/scripts/exported TIBCO project, etc.
* The code/scripts/project are not explicitly graded; they are used to verify against your solution as described in report if required.

**Submission**

* + Deliverables are to be submitted **electronically** through eLearn. All other medium for submission (e.g., email) will not be accepted unless otherwise specified by your instructor.
  + You **MUST** use the submitted presentation slides to do your presentation
  + All submission deadlines **must** be strictly adhered to. You are strongly encouraged to submit **early**
  + Penalty for late submission is as follows:

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| within 1 hour | 10% deductions off the marks you deserved |
| each subsequent hour | Penalty will double (i.e. 20%, 40%, 80% and finally 100%) |

* + 15 minutes will be given at the start of class for all teams to set up their demo and nobody should be changing any code or configuration thereafter. Any team found making changes while other teams are presenting will be heavily penalized or even get zero for the presentation/demo component.
  + Do note that you can also be penalised should you not be adhering to any of the requirements.

**Guidelines**

* You can think of any new scenario or re-use the scenario you have presented for Assignment 1 by making the necessary modification required to satisfy the requirements of this Assignment.
* Your scenario can be imaginative or futuristic but it must be legal and morally suitable for use in academic settings. E.g., scenarios suggesting illegal gambling will not be allowed. You should think through the processes involved in your scenario, make any of your assumptions clear, and may consider ways to make your integration solution fault-tolerant and load-balanced.
* Use simple code for the JMS applications.
* Do not try to cover excessive scope, instead spend appropriate amount of time that satisfies the requirements.
* Use all the Labs in the EI course to guide you through this Assignment.
* Building UI is nice but if it does not help you in any other way (e.g., improving your presentation, etc that makes sense to your deliverables), except just looking pretty, it is not going to earn you a lot of marks or any at all.
* Do not hardcode any IP addresses. Store them in a properties file for easy update. No extra time will be given for IP address changes during presentation.

**Some examples of going beyond labs**

* Exploring new TIBCO BW activities that are not covered in the labs in your implementation
* Address web service security concerns by implementing WS-Security mechanisms when using some external services
* Exposing a web service on the .net platform & trying to consume it from a java client or vice versa (visual studio.net can be used here)
* Integration to Salesforce.com, Facebook, Twitter or other external applications
* Usage of external web services that requires additional SOAP header parameters
* Integrating with business rules mechanisms
* Any other thing that is related to integration

**Potential pitfalls**

* Repeating assignment 1. You design a scenario that has various exchanges of JMS messages (just like assignment 1). We are not testing you twice. You MUST use TIBCO BusinessWorks for this project; refer to the “Data Transformation” and the “Putting it all together” labs for examples of using TIBCO BW.
* Failure to demonstrate your solution either due to lack of preparation or that you are changing your code or TIBCO project while another team is presenting. Failure to demonstrate your solution gives you a failure mark in demonstration section right away. We will give the all teams 15 minutes at the start of class to set the demo screens and start the various services (EMS server, WAMP engine, TOMCAT server etc), reset values in database etc. After which, no teams are allowed to be “busy” working on the project while others are presenting. Failure to comply will receive further penalty at instructors’ discretion.

**Important notes**

* DO NOT misuse the services kindly provided by the service providers listed below.
* As a rule of thumb, use your official SMU email to create only **ONE** test/demo account.
* Test once or twice with the actual setup (as per what you have registered) and after that, simulate the replies or output for testing purposes to reduce the hits required on these live servers.

E.g. I have registered for an email service via a web service. After testing it via code to send emails via this web service once or twice knowing the behaviour, I replace the code to mimic the sending and receiving of emails to get things still working (although not like production). Only when it is nearer to the presentation, I will test it a few more times before changing the code to use the live server for the demo.

**Web Services Resources**

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| Google | <http://code.google.com/> |
| Amazon | <http://aws.amazon.com/> |
| Xmethods | <http://www.xmethods.com> |
| Xignite | <http://preview.xignite.com/Default.aspx> |
| Strikeiron | <http://www.strikeiron.com> |
| Remote Methods | <http://www.remotemethods.com/> |
| Facebook | <http://www.facebook.com> |
| PayPal | [http://www.paypal.com](http://www.paypal.com/) |
| YouTube | [http://www.youtube.com](http://www.youtube.com/) |
| Twitter | <http://www.twitter.com> |