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Managing Regression Suites in Financial Services (Fund Transfers) - Using TTCN-3

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Context

- To meet the growing Business demands, the Client always tries to enhance their applications by providing accurate and timely services to Customer.
- Funds Transfer is one such area, which goes through frequent changes and is a big challenge for QA Team to ensure smooth delivery of application modules into Production.
- Here, we are exploring the possibility of defining the regression test suite of online fund transfer using TTCN-3.
- This paper provides various strategies and methodologies to optimize the Regression testing Cost while sustaining the Quality and Improving Time to Market by using TTCN-3 framework.

Overview - Funds Transfer

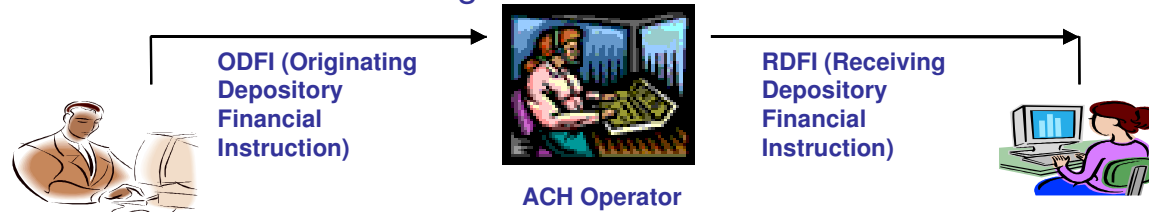
- Funds Transfer plays a pivotal role in Banking and Capital markets. It is a critical LOB for the success of any firm.
- The “Online Funds Transfer” is a service for customers to transfer funds between accounts of the same bank or different banks via Internet Banking where bank has facilitated the customers to reduce the time in transferring money.
- This is one such area which goes through frequent changes and is a big challenge for QA Team to ensure smooth delivery of application modules into Production.

Business process Flow:

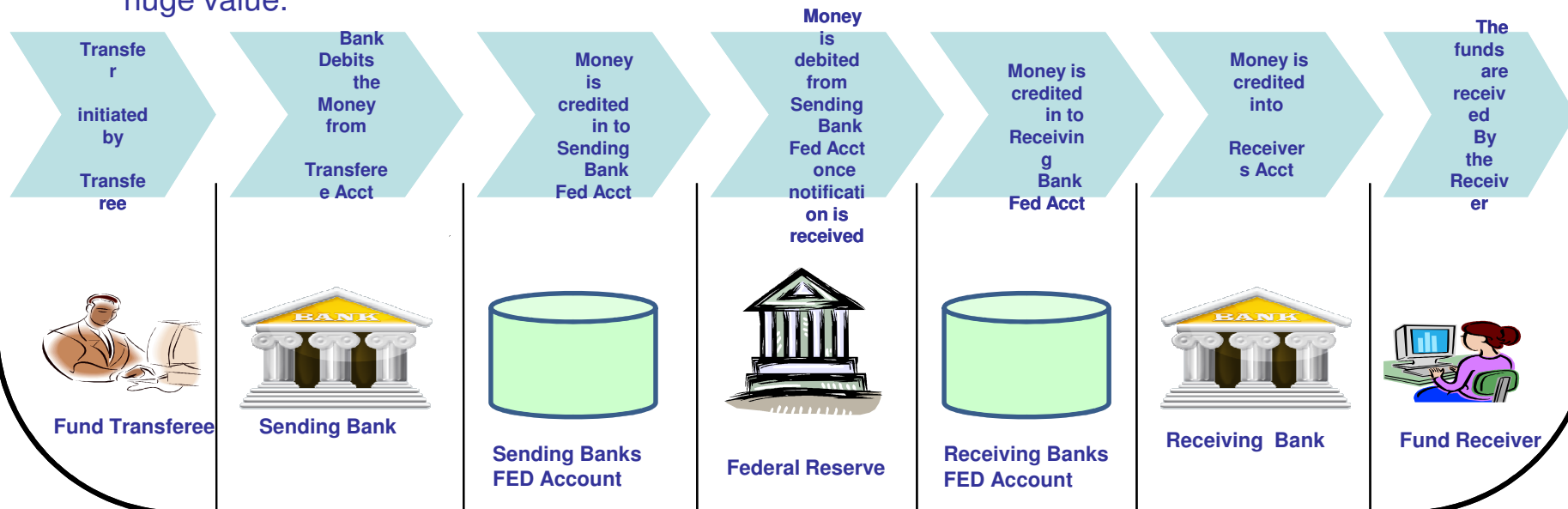


Types of Fund Transfers

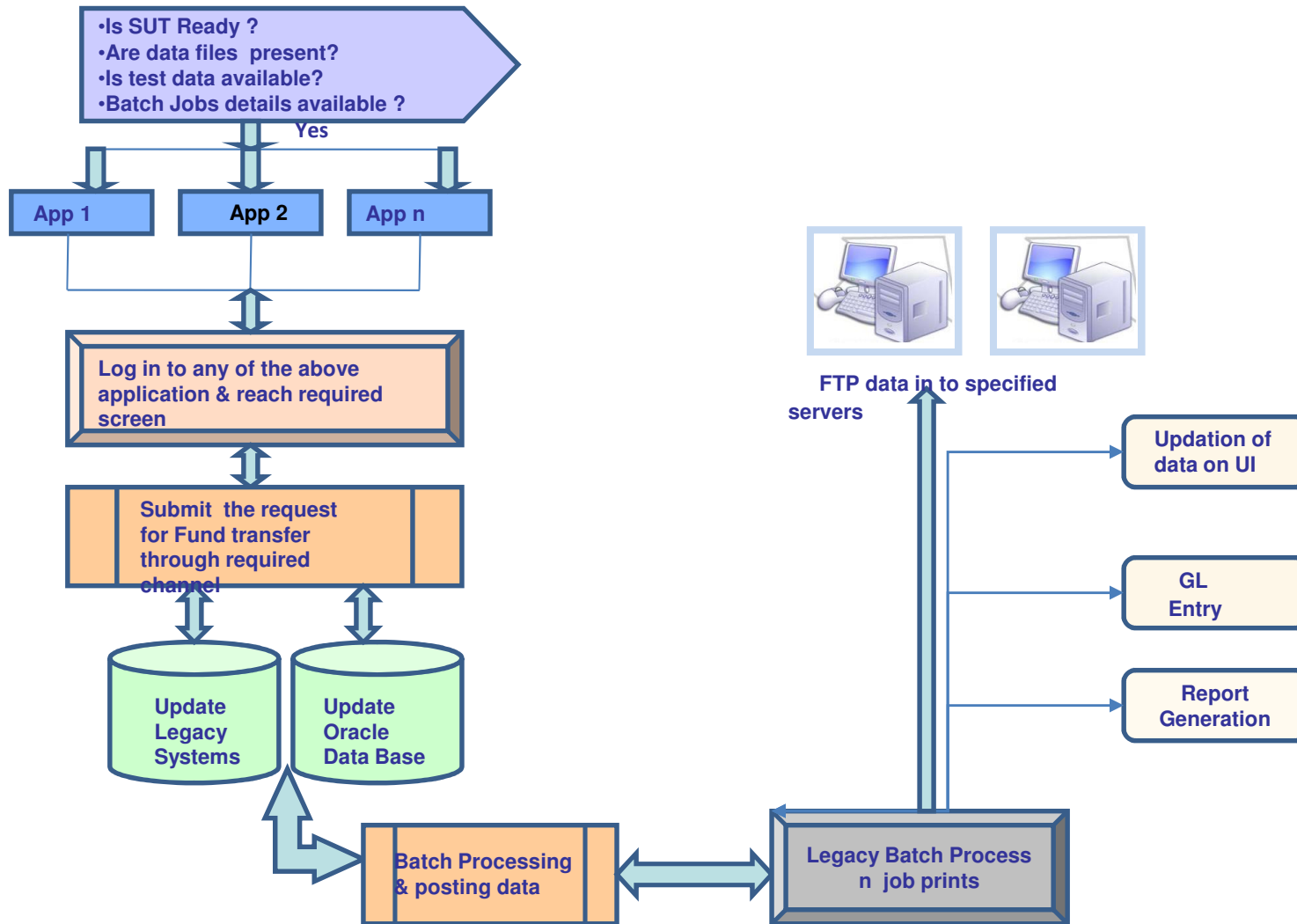
- ACH Fund Transfer: Automated clearing houses where the fund transfers happens from one institution to another. Here we find that the system collects many low value funds transfer entries from individuals and transfer it as one large volume transaction.



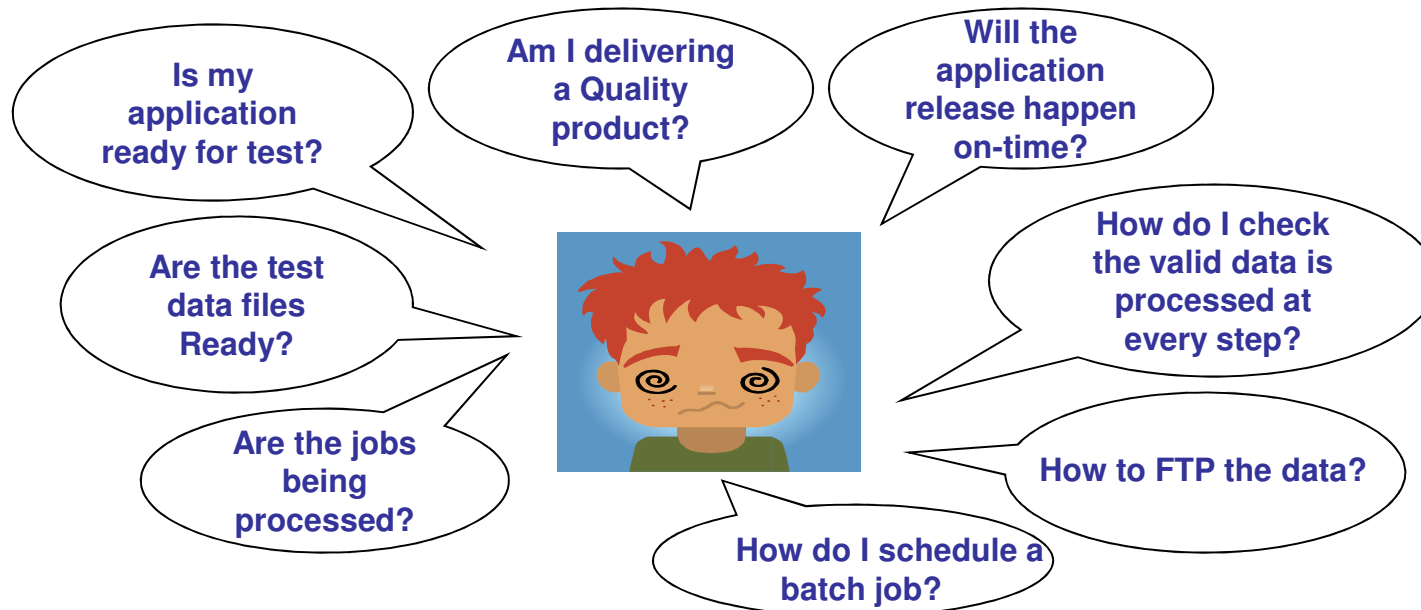
- Wire Transfers: It is used when there is a need to transfer funds immediately with in 2-3 days time span. The transfer can happen for small or large amounts of money /any financial instrument with huge value.



Technical Aspects



Challenges



Since, SUT involves various systems like Web Applications, Data bases and Unix servers ,it is difficult for traditional automation tools to automate the test case integrating all the systems in to one test script also scheduling them.

Note: It is important for the QA team to arrive at optimal strategy that addresses Optimized Cost, Better Quality and Improved Time to Market.

TTCN has a solution for all these issues !!

TTCN3 Salient Features

- The Testing and Test Control Notation Version 3 (TTCN-3) is an internationally standardized language for defining test specifications for a wide range of systems.
- It allows the concise description of test behavior by unambiguously defining the meaning of a test case Pass or Fail. Also, helps in improving Accuracy and Efficiency of the Functional and Regression test suite.
- It is used to define test cases at different levels of abstraction that are more robust in the face of volatile presentation and implementation details.
- It is independent of frameworks and SUT. Hence the cases can be reused.
- It also has the feasibility of multithreading for testing complex applications.
- The framework has good exception handling and recovery capabilities. This helps in reducing the debugging time.
- Test cases can be run with multiple sets of input data.
- It is a well defined model which can be easily understood by any tester and hence removes the resource dependency.
- Since, the Financial domain has multiple iterations of testing between varied systems , TTCN3 is an ideal choice for it.

Application of TTCN3 in automating Money

transfer Application

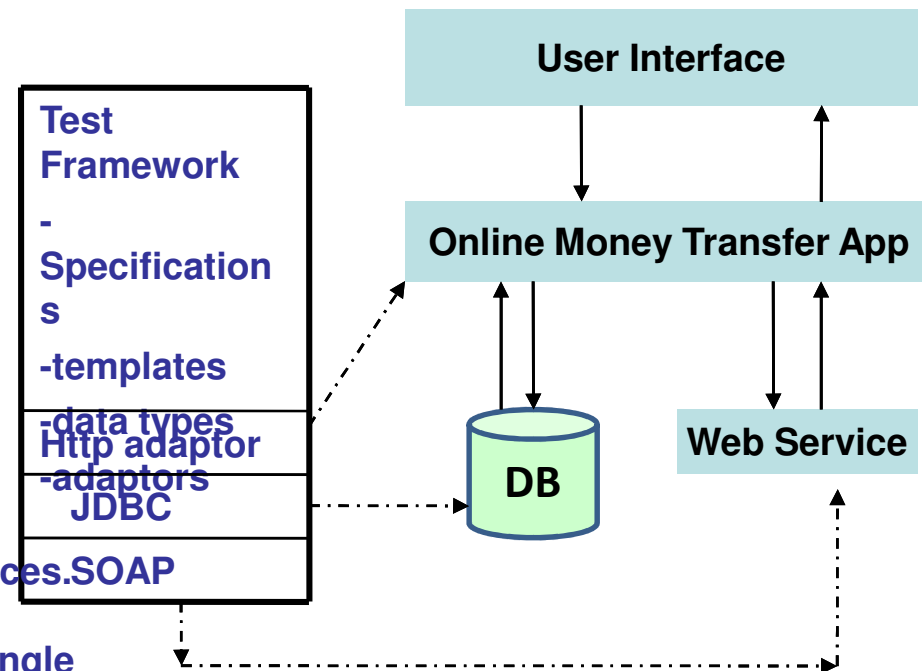
- The major problem faced while performing integration testing was setting up the test data. This can be overcome by using the templates (created/existing) in the abstract layer, which in turn would increase the reusability.
- The verification checks performed at various systems like User Interface level, Data Base, Web Service level can be validated in a single script by making use of the integration and scheduling feature of TTCN3.
- Writing a test adapter is a fixed effort and could be used for subsequent rounds of testing when there are any enhancements.
- The only coding effort which needs to be provided here is templates containing the test data and test behavior containing the sequence of events and alternate events tree.
- Helps in correlating the intermediate test results in single data format.
- Helps in Scheduling and parameterization.

Application of TTCN3 in automating Money Transfer

transfer Application Contd

- ✓ Here while creating Money Transfer the HTTP adaptor can be used to test the UI level validations like the URL being used ,Links , forms generated etc.,
- ✓ Once the Transaction is created the data is updated in Data base systems. Here we can use the adaptor to validate the data that is entered / updated.
- ✓ Once the Transaction is created the web services are called to update the data in to various systems. Here with the help of Adaptor we can validate the services being called and the updation of the data done on various interfaces.
- ✓ All these validations can be put in to ONE single script by making use of the integration and scheduling feature of TTCN3.

Integration Testing using TTCN3



Sample Code Snippet

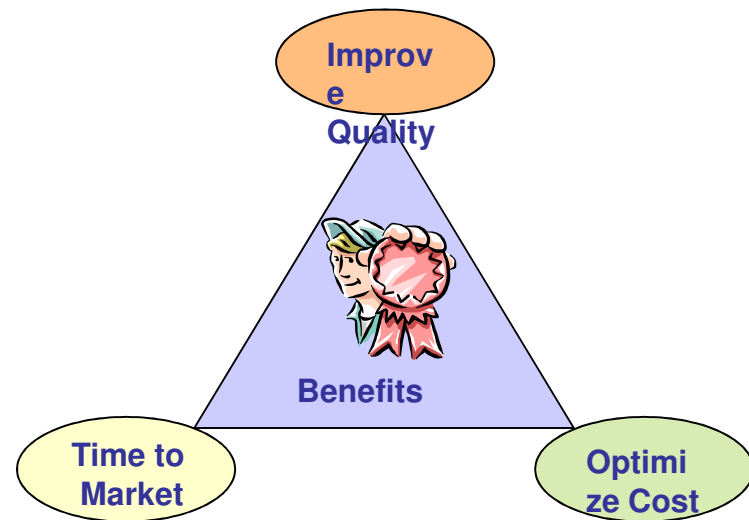
```
Module Integration_Testing {
  Template formSubmitType SendETransfer:={
    FormName:= "Send Money",
    buttonName= "Send",
    actionValue:=
      :http://servername:1234/efundApp/servlet/....",
    parameterValues :={
      {parmName := "To Account",parmValue:="1234567890"},
      {parmName:="Amount", parmValue:="110.0"}
    }
  }
  testcase test_fundTrasfer () runs on MTCType system SystemType {
    Webport.send(triggerETransfer);
    dbPort.send(insertETransferRequest);
    alt{
      [] webport.receive(Acknowledgementpage(transferredmoney)){
        Setverdict(pass)
      }
      [] webPort.receive{
        Setverdict(fail)
      }
    }
    control {
      execute(test_fundTrasfer ())
    }
  }
}
```

Snapshot of the Traditional approach Vs. TTCN3 approach

Other tools	TTCN3
<ul style="list-style-type: none"> ❖ Feasibility for Modification of Automated scripts is limited and requires more manual intervention. ❖ Becomes difficult to manages testing the whole suite especially when there are many OS upgrades, Enhancements, Infra structure releases. ❖ Number of Traditional Testing tools used to test varies from 2 to many. 	<ul style="list-style-type: none"> ❖ Feasibility for Modification of Automated scripts is very High and less manual intervention is required. ❖ Easy to handle the Regression suite with any number of Functional and Regression cycles, OS upgrades, Enhancements, Infra structure releases.
<ul style="list-style-type: none"> ❖ Use standard metrics for all projects. ❖ Performance of the project can be accessed after collating all the reports generated from various Tools. 	<ul style="list-style-type: none"> ❖ TTCN3 approach would support all the Back Design the metrics. ❖ Performance of the project can be accessed from one report which can be generated by TTCN3
<ul style="list-style-type: none"> ❖ Maintenance effort will be high for generic programming language. 	<ul style="list-style-type: none"> ❖ Maintenance effort will be low and hence ROI is more.
<ul style="list-style-type: none"> ❖ If the framework changes the code cannot be used. 	<ul style="list-style-type: none"> ❖ Code can be reused on a different system as well
<ul style="list-style-type: none"> ❖ If we need to rewrite the code using different framework the entire code has to be written from the start. 	<ul style="list-style-type: none"> ❖ as different framework. If we need to rewrite the code using different framework only the codec part needs to be written.

Strategic benefits of TTNC3 approach

- Focus on quick and accurate execution.
- Minimize manual intervention so that effort can be better utilized.
- Increased regression test coverage.
- Reduced time to Market because of shorter Test cycle .
- Productivity improvements in projects can be determined by automating the batch process involving many servers, data set up.
- Cost savings in providing QA services through better operations which in turn increases ROI.
- The maintenance cost of the QA Services decreases, since all the modules involving Batch jobs, Data bases and Web services can be automated. We can bring in 30% of dollar savings to the customer by ramp down of QA resources.



References :

- > **TTCN3 portal**
- > **Project Experiences**

Thank You