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Test Data Provision for ERP Systems

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OVERVIEW

- What is ERP & ERP Data Types
- Test Data Types
- Data Modelling
- Challenges
- Input Test Data
- Test carried out during development phase.
- Addresses different additional concerns like test data confidentiality and limited system access.
- The issues concerning test data discussed in this paper are relevant for customer testing.
- Conclusion & Future Research

ERP (ENTERPRISE RESOURCE PLANNING)

- Built to support business process.
- SAP R/3 consists of 250 Million lines of codes and it's considered one of the largest software systems.
- ERP software integrates many organizational parts and functions into one logical software system.
- Huge Data volume makes ERP systems very complex.

ERP DATA

- In the ERP world, data can be interpreted from two Perspectives: Business & Technical perspectives
  - Business perspective.

    - Master Data : represents static data that remains valid over a period of time and is used in several use case scenarios. For example supplier information (such as name and address) or product information is stored once.

    - Transactional Data: short-lived, used only for a specific transaction and can always be related to master data. For example ordering of a product will be processed in a sales order transaction. Information like the quantity of products or the delivery deadline is individual for the order.

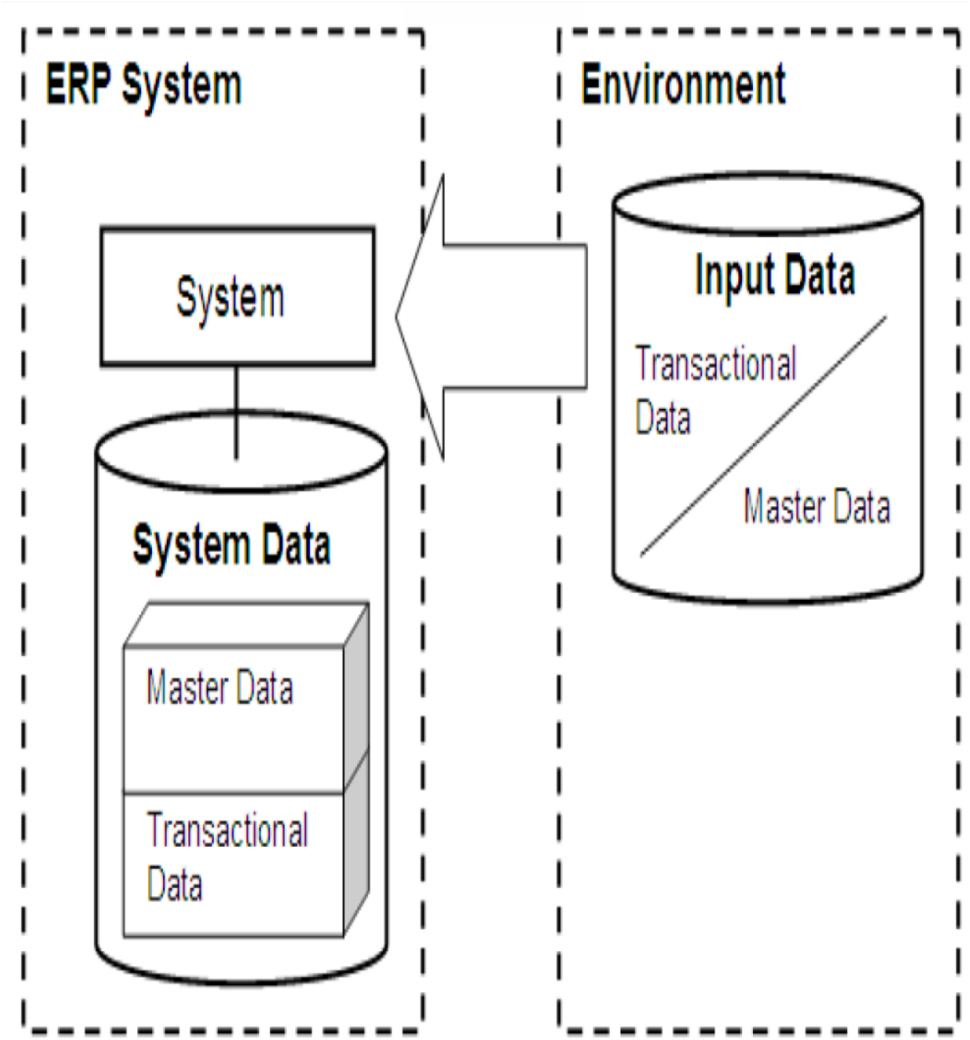
ERP DATA

– Technical perspective.
  - From a technical perspective the distinction between master data and transactional data is less relevant.
  - All transactions in a system have to be stored in databases.
  - In the previous example of a sales order, only the transactional data is saved explicitly while master data is referenced.
  - More important from a technical perspective is the distinction between user generated and Automatically derived data for a transaction.
  - Transactional data is not only generated by user input but also might be derived automatically (e.g. the current date) or from a prior transaction. For example the quantity of a product in a sales order might be determined by the current need for production or a request from a customer. Therefore, a technical distinction between system data and input data will be used

OVERVIEW OF ERP DATA

- **System data** serves as the applications internal data set. It is stored in a database that is directly accessible from the application. Access from the outside is usually very limited.

- **Input data** is all information that has to be provided from outside by users or external components during execution and cannot be derived automatically. The input data may be master or transactional data.



TEST DATA TYPES

- Test data generation has been discussed in the context of automated testing from the very beginning

  - White-box testing : like symbolic execution, actual execution, and random testing are used. They are based on code analysis or code execution tracing to find value sets needed to execute predefined paths through a system under test.

  - Black-box testing: in particular MBT (Model-Based System), test data can be generated from several types of specifications like finite state machines, pre/post models, or UML transition-based models. Most of the research addresses the test data generation for each test case independently and less the global consistency of different test data.

BLACK BOX TESTING

- As software systems are becoming more complex, new levels of abstractions are introduced

both in software development and testing. Model-based testing (MBT) is a kind of black-box testing that uses structural and behaviour models, described by UML diagrams, to automatically generate abstract test cases, thus automating the test case design process

  - Observation (or verification) Checks and
  - evaluates the test results.
  - Teardown: Takes the SUT back in some standard state, where the next test can run.

TEST CASE

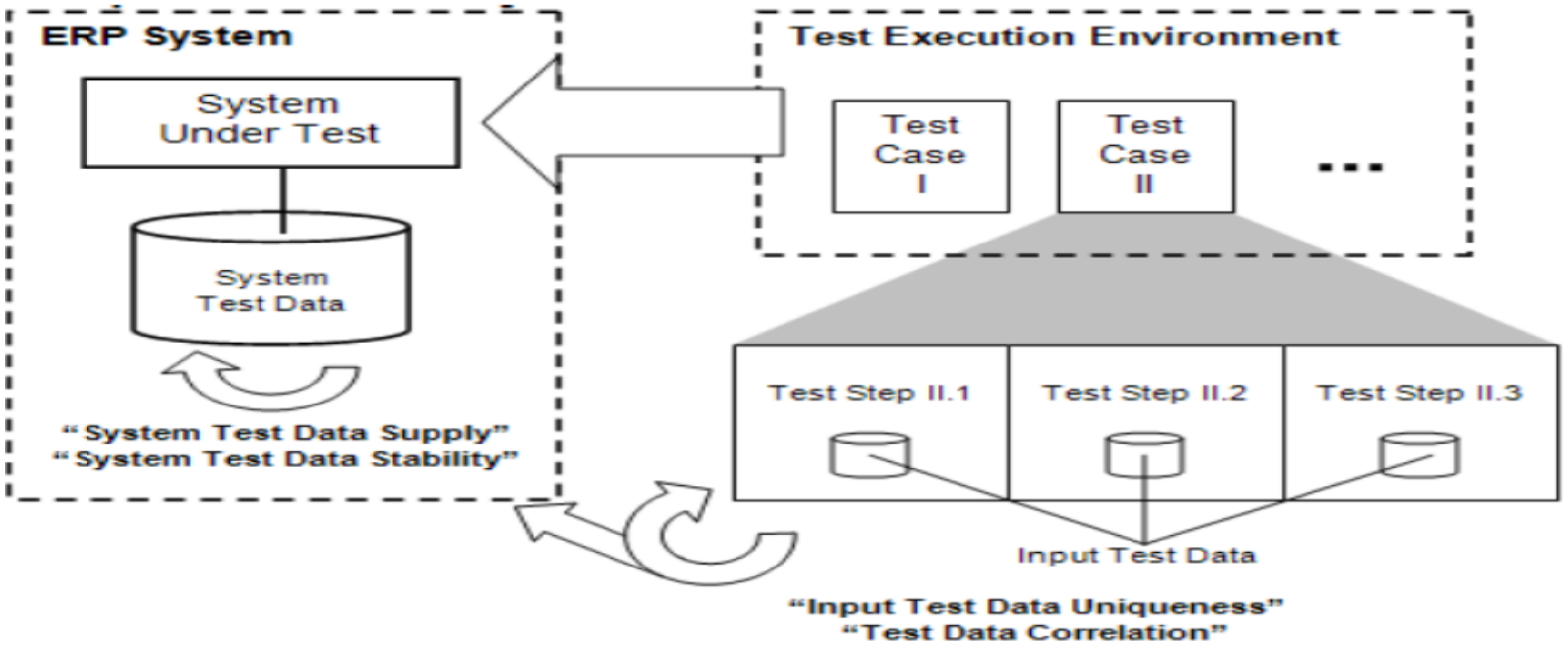
- A test case describes the operational steps through which a certain functionality of property of the System-Under-Test (SUT) is validated.
- A test case consists usually of the concatenation of four procedures:
  - Preamble (or setup): Sets the test up.
  - Getting the SUT into the correct state to run the test.
  - Body: Executes a certain scenario or sequence of steps described by the test case in the SUT.
  - Observation (or verification) Checks and
  - evaluates the test results.
  - Teardown: Takes the SUT back in some standard state, where the next test can run.

DATA MODELLING

- Usually applied in the field of database layout planning and management Relational modelling, e.g. using the Entity -Relationship Model, is the most common way to describe database schemas and languages like SQL have been invented to retrieve the data from such relational databases.
- The object relational database model recently came to prominence, reflecting the paradigm shift in programming and providing an object oriented data structure in databases.

CHALLENGES

- ERP system needs a test execution environment that groups a suite of test cases.
- In the case of MBT, this will contain information on the structure and behaviour of the system.

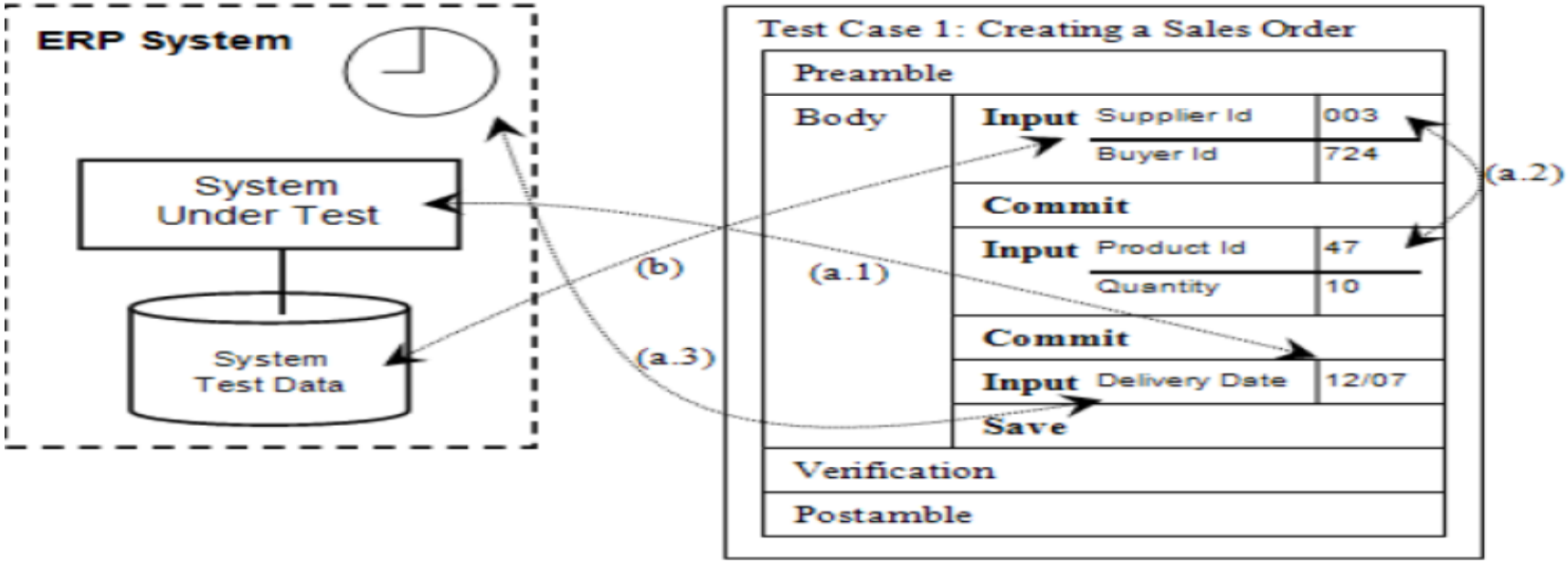


CHALLENGES

- The execution environment must be stable and deterministic in order the achieve repeatability of the test process.
- Each test case has specific test data associated with each of the test steps.
- The quality of test data must ensure a good coverage and error detection capabilities.

INPUT TEST DATA

- ERP system testing the input test data relations can be classified in two groups:
  - A) Input test data constraints describing the correlations inside a test case that are unrelated to the system data.
  - B) Relation between system and input data.

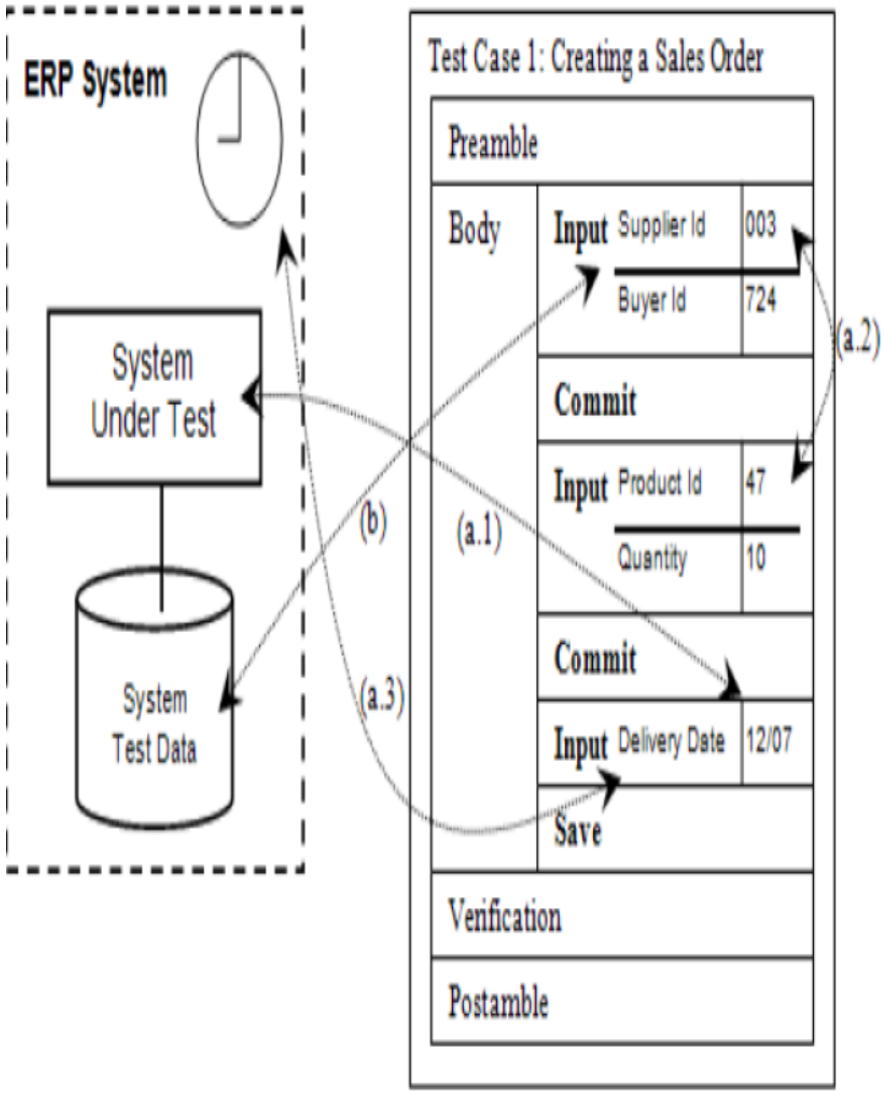


INPUT TEST DATA

– Input test data constraints describing the correlations inside a test case that are unrelated to the system data. They can be refined as:

  - A.1) syntactic input data constraints
  - A.2) intra test case constraints
  - A.3) contextual input data constraints

– Test data correlation describing the relation between system and input data.



CONCLUSION

- In this paper special characteristics of test data in ERP systems have been described.
- Test data supply & stability have been identified as major issues.
- The next-generation product of SAP for midmarket, SAP Business ByDesign1, will employ data types on a generic level (core components) and data types for specific vertical industry.

FUTURE RESEARCH

- Categorization of test cases (e.g. system data consumer / system data dependent / system data independent) and then an orchestration of individual strategies will be part of such a solution.
- Modelling of test data for large ERP systems in the context of MBT and its annotation with constraints.
- How to provide data for regression testing when the system under test cannot be easily reset.

Thank You for attending

Any Questions ?