Tricentis

Strategies for Optimizing Test Data Management for End-to-End Testing

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WHO WE ARE

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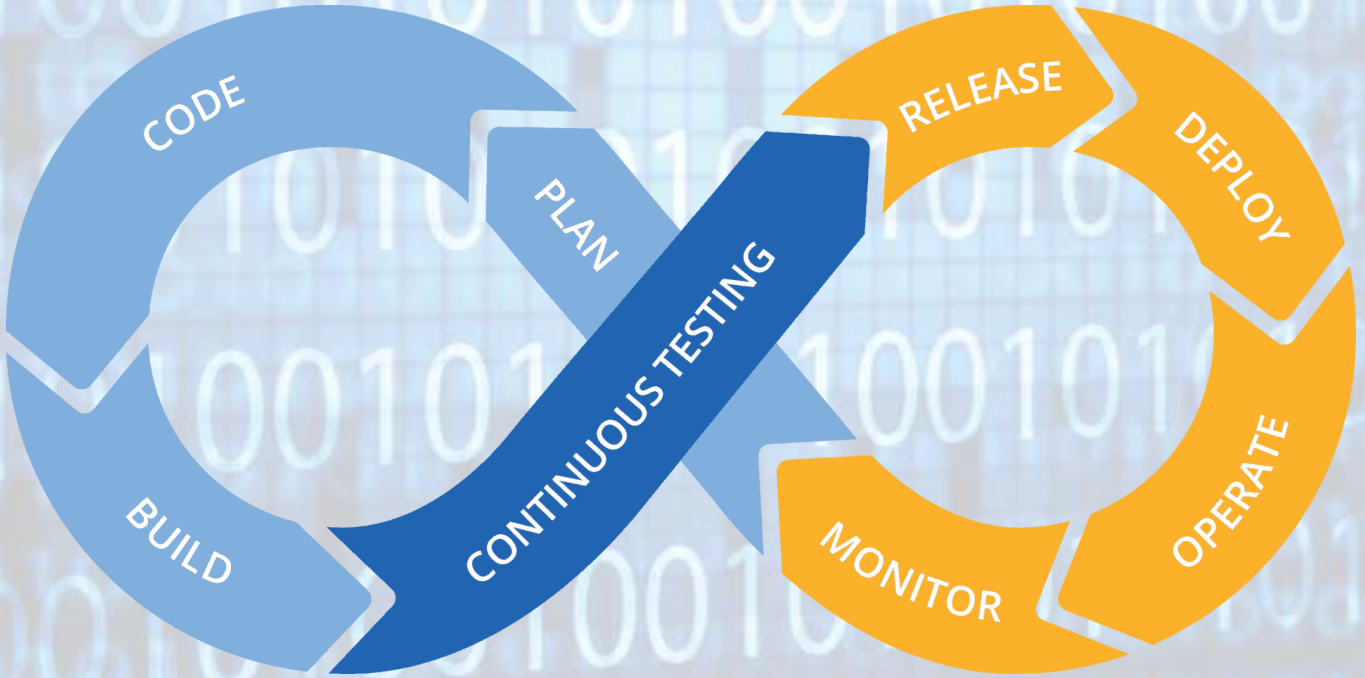
Agenda

1. Business Challenges
2. Enterprise End-to-End Testing Scenario
3. How to:
   - Mask Production Data & Generate Synthetic Test Data
   - Design Data-Driven Test Scenarios
   - Keep Data Stateful End-to-End
4. Resources

“Data is testing.”

-Jeff Fillegar, Solution Architect, Tricentis



Challenges in achieving high levels of automation

Automated Execution Levels

Functional Test Cases = 16%

1	High frequency of application changes	65%
2	Availability of test data and environments	48%
3	Lack of skilled and experienced resources	46%
4	Don’t have the right automation tools	42%
5	Too many automation tools	39%

How is test data impacting businesses today?

Manual effort spent on finding & creating test data

Testers in organizations also perform Test Data Management related tasks

Use scripting for test data generation

Companies who copy production data apply masking techniques

- Complex end-to-end processes require test data to be in certain, well defined states
- Production data may be scattered, incomplete and difficult to obtain
- Test data may expire (e.g.: date, user age, contracts)
- Working in distributed environments and governing access to sensitive data

Enterprise end-to-end testing (example)

Step 1
Place an order (account)

Customer

Prepare test data (masked production data for customer & product)

App backend

Step 2
API backend verifies and retrieves order, also validates email sent to customer ID

Step 3
Check product availability in SAP Wholesale. Inventory is then transmitted

Step 4
Create sales order in SAP

Step 5
Ship products when ready (SAP)

Step 6
Customer is billed using SAP

Step 7
Export financial information to Salesforce and perform analysis

Strategies to test data management

User	Password	Customer
testuser1	t3stuser!1	Elektromarkt
testuser2	t3stuser!2	Elektromarkt
testuser3	t3stuser!3	West Supermarkets

eCommerce website

Materials			
Id	Name	Price	Stock
M-08	Laptop Dell T90	890	120
M-09	Laptop Dell T90	580	200
M-10	Mouse XLK	5.8	1000
M-11	Keyboard i8	7	990

SAP

Sales orders detail		
Number	Product Id	Quantity
49232	M-08	5
	M-09	3
49233	M-09	6
	M-08	8
	M-10	9
49234	M-11	15

Sales oders			
Number	Customer	Date	Status
784	Elektromarkt	1/15/2021	Processed
785	West Supermarkets	1/15/2021	Open
786	Elektromarkt	1/15/2021	Closed

Shipping order		
Number	Date	Sales order
9845	1/15/2021	784
9846	1/15/2021	785
9847	1/18/2021	786

Payment order		
Number	Date	Shipping order
2500	1/15/2021	9845
2501	1/15/2021	9846
2502	1/18/2021	9847

SAP and Salesforce

Plan

You want to know in advance which data you need and the scenarios your data will cover.

Access

You don't want to create data every time you use it.

Lock

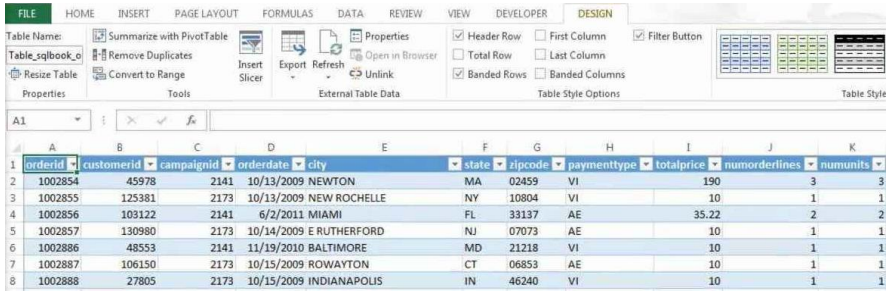
You don't want other people to modify your data and interfere with your tests.

How to obtain test data?

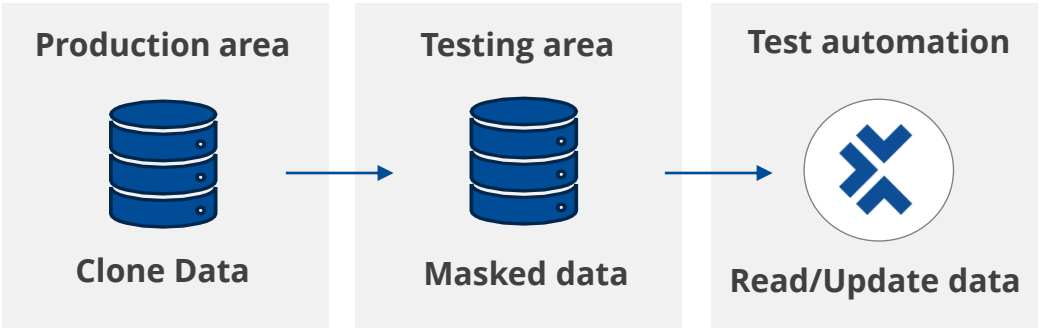
Challenges:

- 64% of manual effort spent on finding & creating test data
- Only 36% of companies who copy production data actually mask it
- GDPR enforces massive fines if PII or sensitive data is breached

Manually

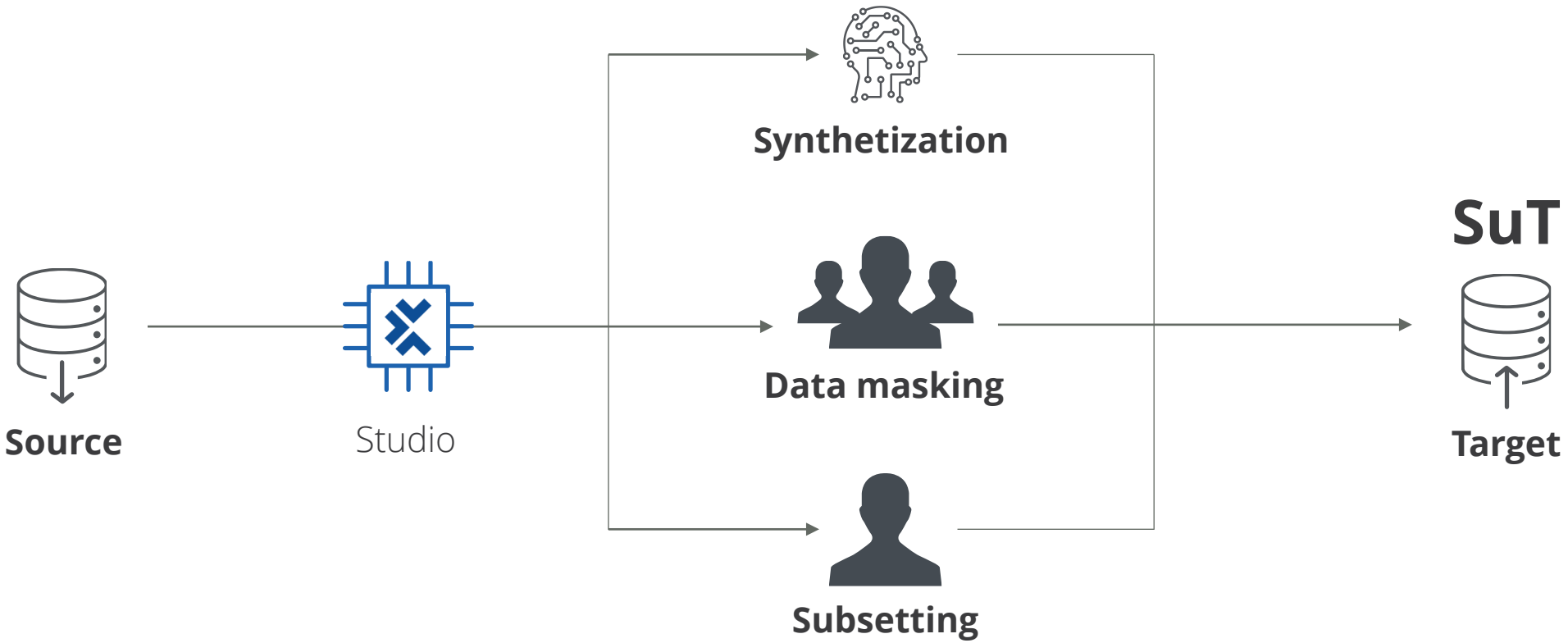


Mask Production Data



Consistently mask production data

- **Read data structures** from data source **quickly & reliably**
- **Automatically recognize** fields for data masking and synthetic values
- Subset data to **save space** and **operate faster**



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Challenges:

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- Extracting production data is laborious, time-consuming and complex. Data may be scattered, incomplete or not possible to obtain

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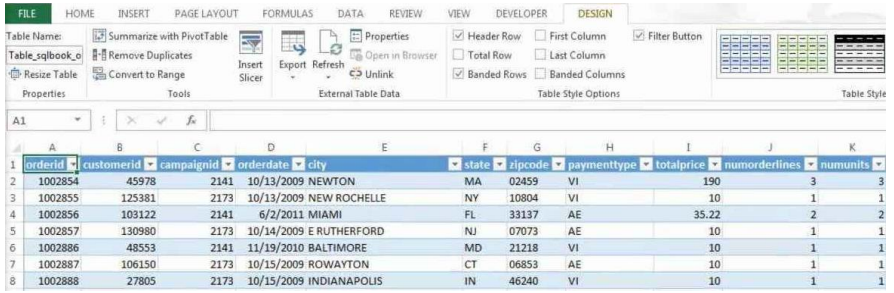

	A	B	C	D	E	F	G	H	I	J	K
1	orderid	customerid	campaignid	orderdate	city	state	zipcode	paymenttype	totalprice	numorderlines	numunits
2	1002854	45978	2141	10/13/2009	NEWTON	MA	02459	VI	190	3	3
3	1002855	125381	2173	10/13/2009	NEW ROCHELLE	NY	10804	VI	10	1	1
4	1002856	103122	2141	6/2/2011	MIAMI	FL	33137	AE	35.22	2	2
5	1002857	130980	2173	10/14/2009	E RUTHERFORD	NJ	07073	AE	10	1	1
6	1002886	48553	2141	11/19/2010	BALTIMORE	MD	21218	VI	10	1	1
7	1002887	106150	2173	10/15/2009	ROWAYTON	CT	06853	AE	10	1	1
8	1002888	27805	2173	10/15/2009	INDIANAPOLIS	IN	46240	VI	10	1	1

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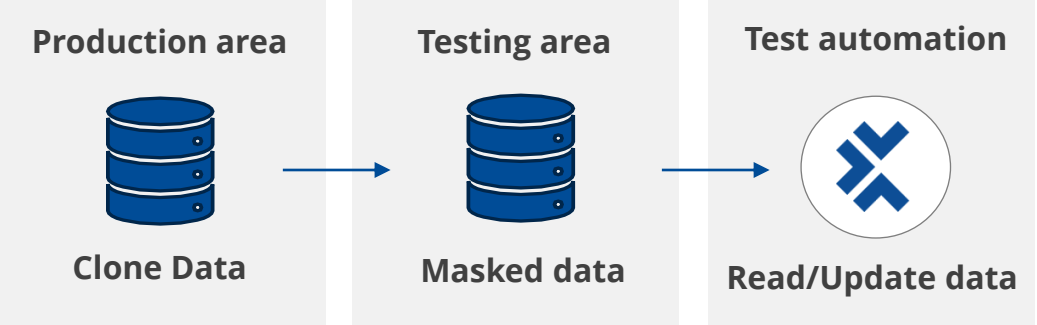
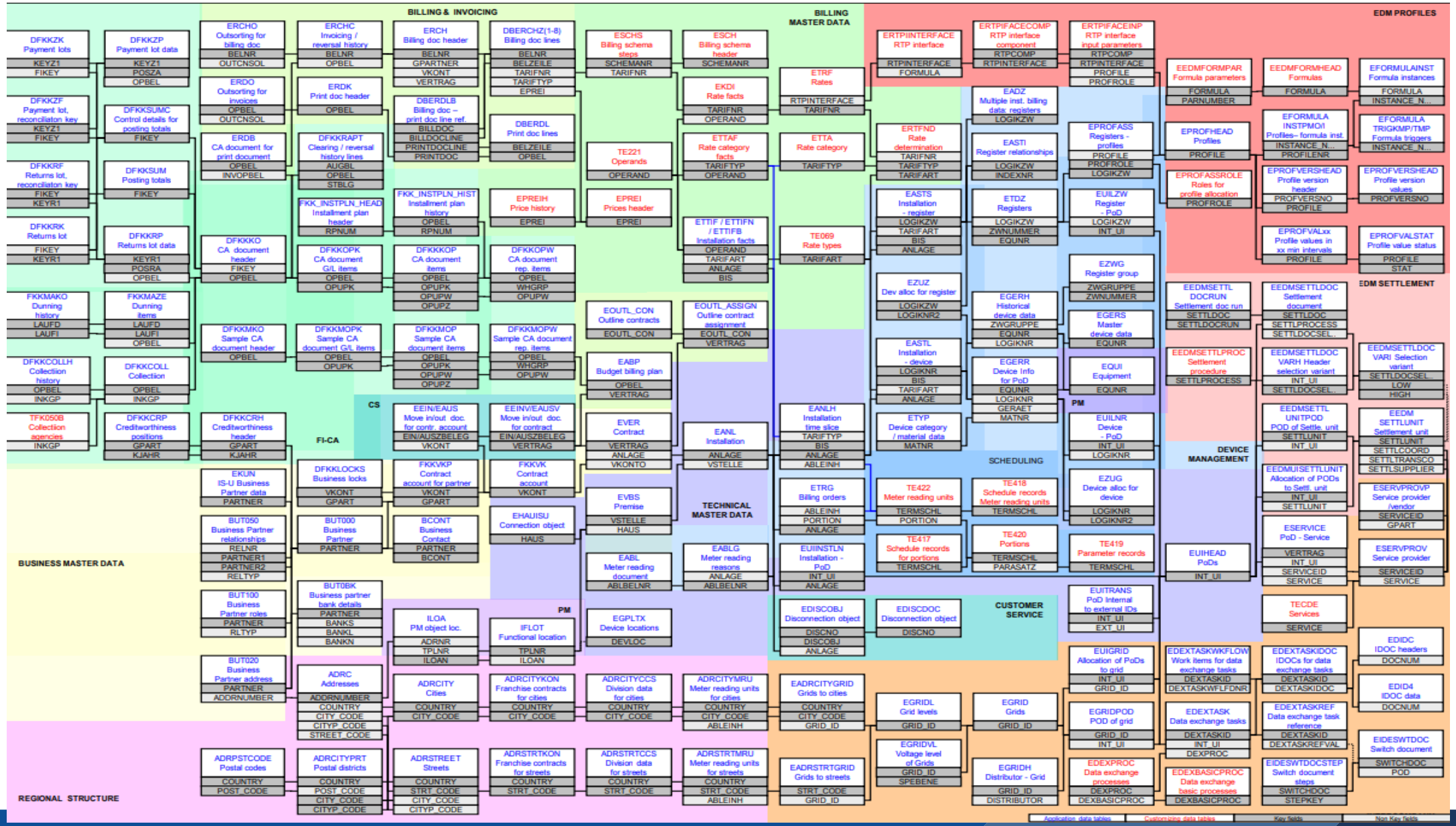


Complexity of Production Data today…



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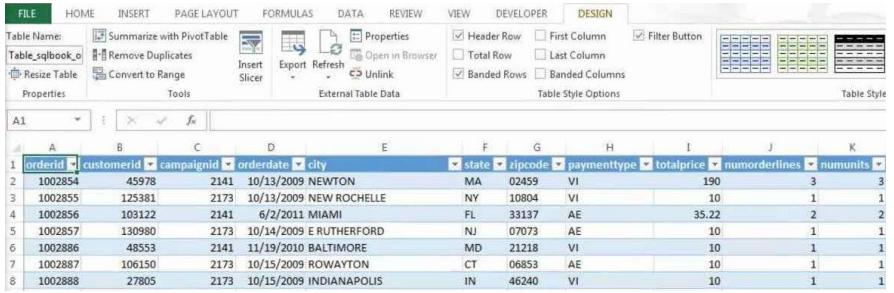

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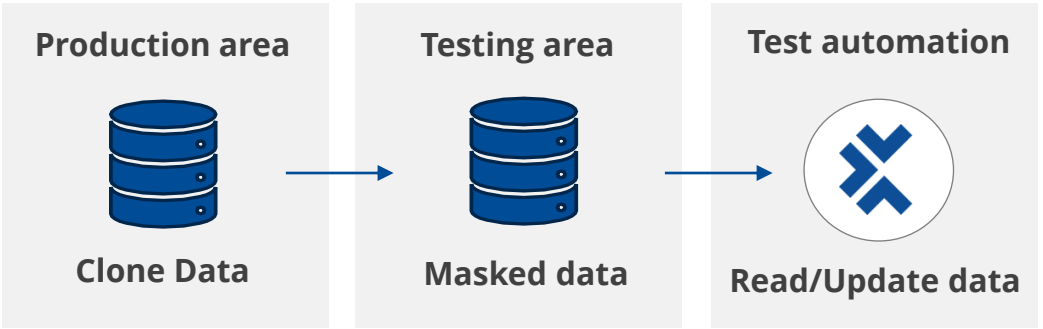


Generate Synthetic Data

- On-demand data
- Full compliance and security coverage
- More data flexibility and control over data

Support for different technologies

Data can be read and written from and to various different technologies, databases, data files, enterprise applications and systems and message queues

File Formats

Databases native

Microsoft SQL Server

ORACLE

IBM DB2 z/OS

Database API

PostgreSQL

mongoDB

MySQL

Enterprise Applications

SAP

Message Queues

MSMQ

WebSphere MQ

Enterprise end-to-end testing (example)

Step 1
Place an order (account)

Customer

Step 3
Check product availability in SAP Wholesale. Inventory is then transmitted

Step 5
Ship products when ready (SAP)

Step 7
Export financial information to Salesforce and perform analysis

Prepare test data (masked production data for customer & product)

App backend

Step 2
API backend verifies and retrieves order, also validates email sent to customer ID

Business requirements:

- Verify order against single product (common flow)
  - Verify order against multiple products
  - Verify order against an invalid product

Test Case Design– how to design test data?

How can you minimize testing effort but maximize business coverage?

Challenges:

- Lack of coverage of business-critical areas
- High level of test effort, redundancy & duplication
- High test maintenance, bloated test suites & cost intensive process

What to test?

Business Requirements

E.g.: Customers > age 85 cannot receive insurance (invalid)

How to test the what?

- Data-driven test scenarios
- StraightThrough / Happy Path
- Given, When, Then approach
- Automatically generate tests

Test Case Design– how to design test data?

Logical Structure

Organize test cases into a logical structure (given, when then approach)

Tests that cover business logic to maximize risk coverage

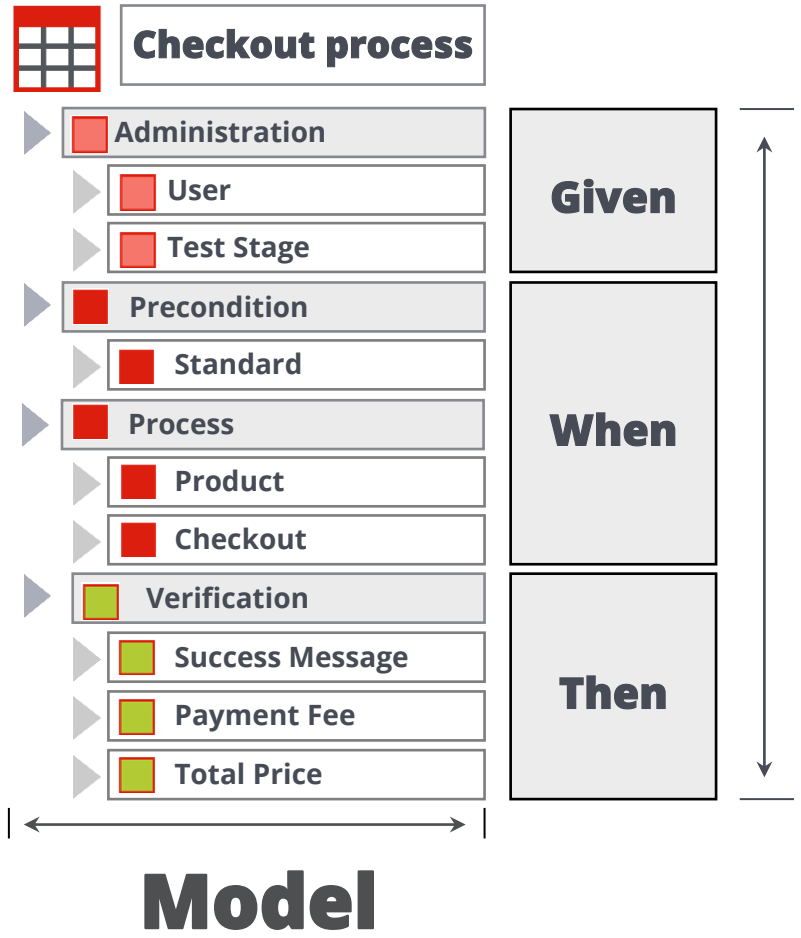
Specify test cases wisely (StraightThrough, valid, invalid) to maximize coverage

Manage test data

Effectively manage static test data

Generate tests based on all variations

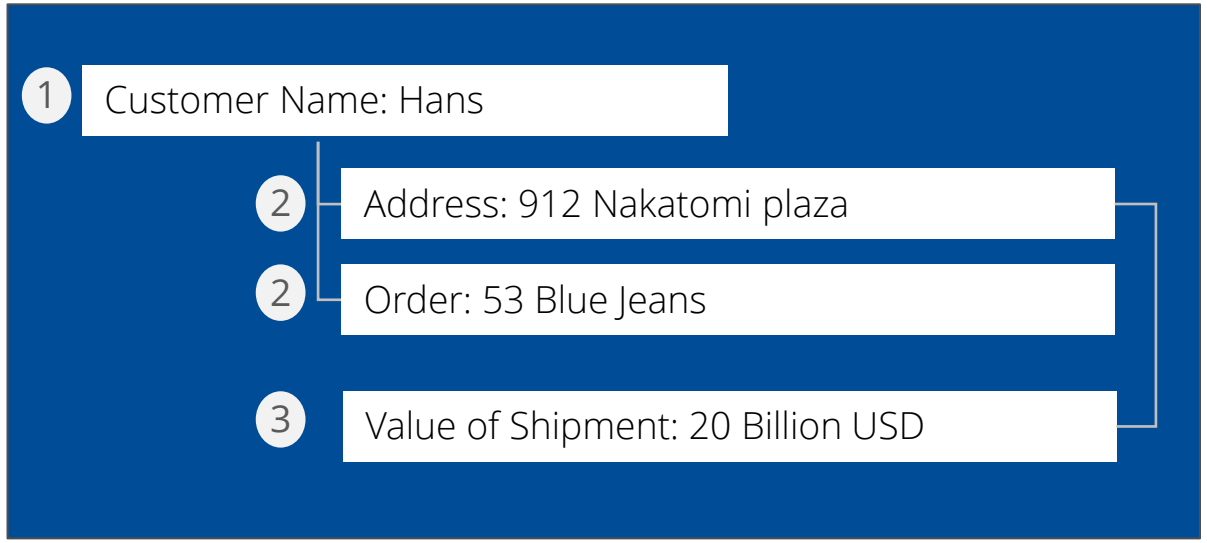
Automatically generate all possible variations for your test cases to avoid manual effort & reduce redundancy upon changes to business/ application



Static vs Dynamic Data

Static data

- Static UI inputs
- Stateless

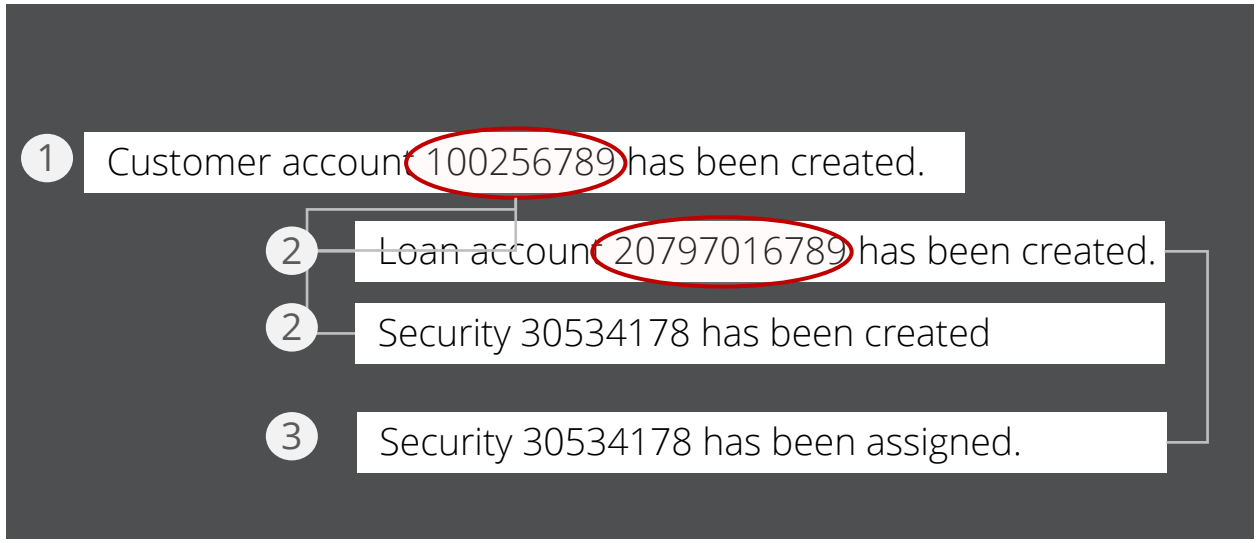


Other examples:

- Vehicle Data
- Insurant Data
- Product Data

Dynamic Data

- System generated data
- Stateful



Other examples:

- Sales Order Number
- Quote Number
- Outbound Delivery Number (SAP)

Enterprise end-to-end testing (example)

Prepare test data (masked production data for customer & product)

Step 1
Place an order (account & credit card)

Customer

Step 2
API backend verifies and retrieves order, also validates email sent to customer ID

App backend

Step 3
Check product availability in SAP Wholesale. Inventory is then transmitted

Step 4
Create sales order in SAP

Generates Sales Order

Step 5
Ship products when ready (SAP)

Generates Shipping Order

Step 6
Customer is billed using SAP

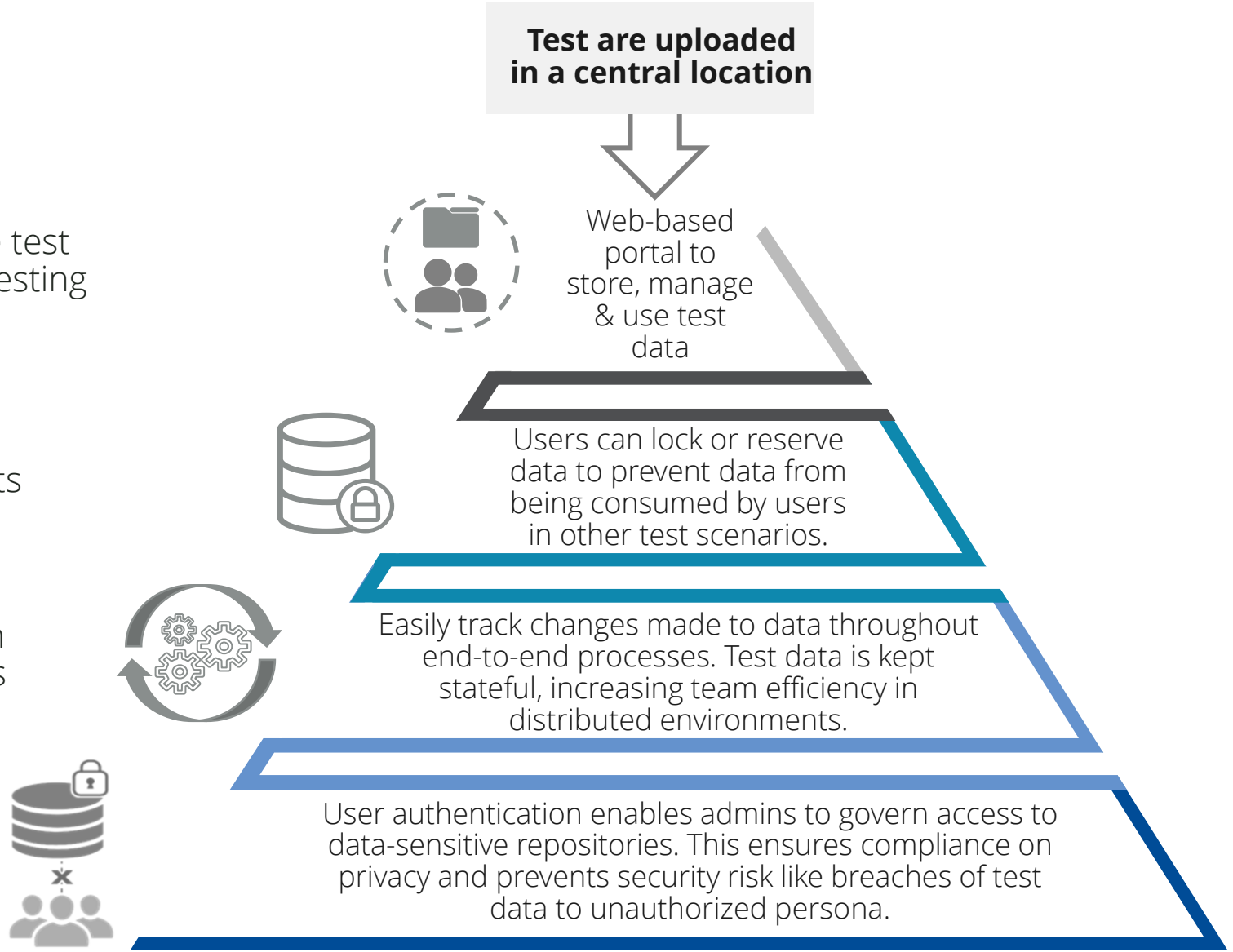
Generates Payment Order

Step 7
Export financial information to Salesforce and perform analysis

Test Data Service – how to keep data stateful end-to-end?

Challenges:

- Lack of visibility and clear overview of where test data is stored and maintained throughout testing
- Difficult to keep data consistent as it gets consumed in distributed team environments
- Lack of data consistency & synchronization throughout complex end-to-end processes
- Governing access to sensitive data across teams



TDS: keep data stateful across E2E processes

Changes reflected in TDS repository

Step 4 - Generates Sales Order

Creates Sales Order

Process Sales Order (VL01N)

SAP Sales Order

Number	Amount	Status
49232	700	Processed Open

Step 5 - Generates Shipping Order

Retrieve Sales Order

Create Shipping Order

SAP Shipping Order

Number	Amount	Status
80027965	700	Open

Step 6 - Generates Payment Order

Retrieve Shipping Order

Create Payment Order

SAP Payment Order

Number	Amount	Status
60260045	700	Open

Recap: TDM Best Practices

Business requirements & end-to-end flow

- What are you testing? What are the requirements?
- Gain knowledge & insight into the end-to-end flow (start with the end in mind)

Data-driven test scenarios

- Conceptually design tests before implementation, minimize test effort and maximize risk coverage
- StraightThrough scenarios / most common flow
- Negative scenarios (invalid values that verify proper error handling)
- Boundary conditions (data values at extremities)
- All other important functional flows defined in the requirements
- Methods to manage static vs. dynamic data

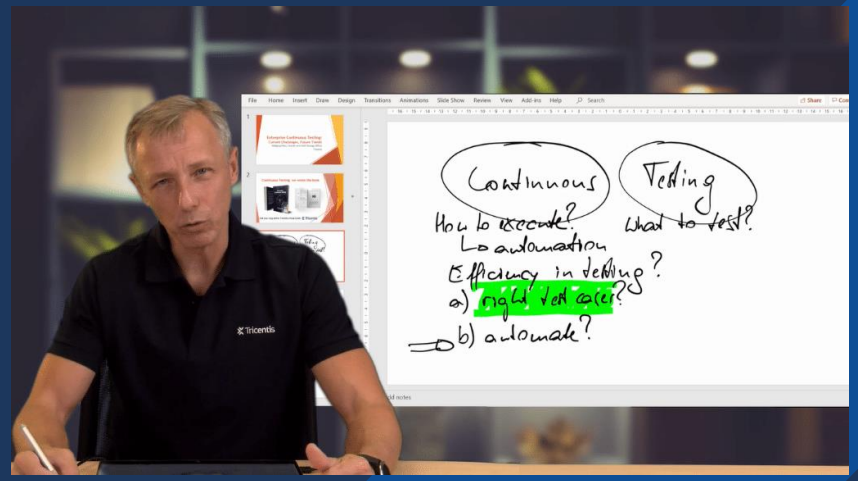
Data provisioning

- Methods to mask production data or use synthetic data generation
- Ensure compliance

Keep data stateful through a centralized repository

- Methods to lock/unlock data during testing
- User authentication and authorization for data-sensitive repositories
- Maintain clear view of consumption of data for end-to-end testing

Where to go from here?



Connect with us on LinkedIn or Email

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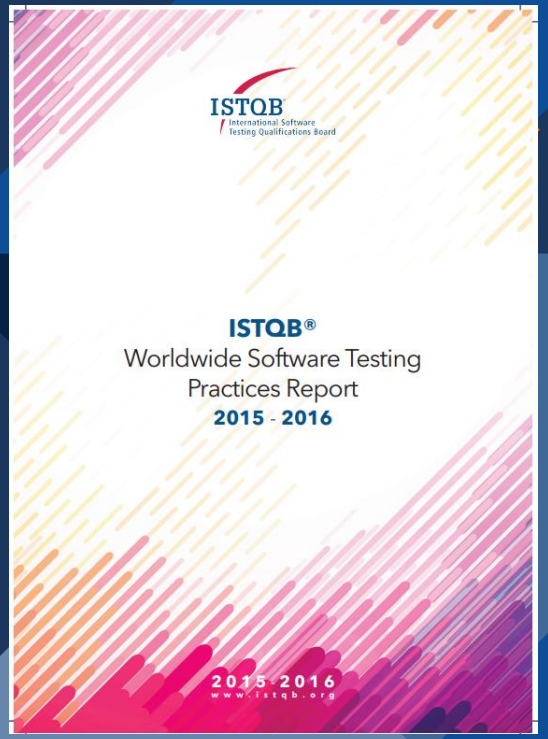
Check out these Resources:

Wolfgang Platz – Enterprise Continuous Testing in a Flash

Forrester – A platform approach to testing

ISTQB: Worldwide Software Testing Practices Report



Thank You!