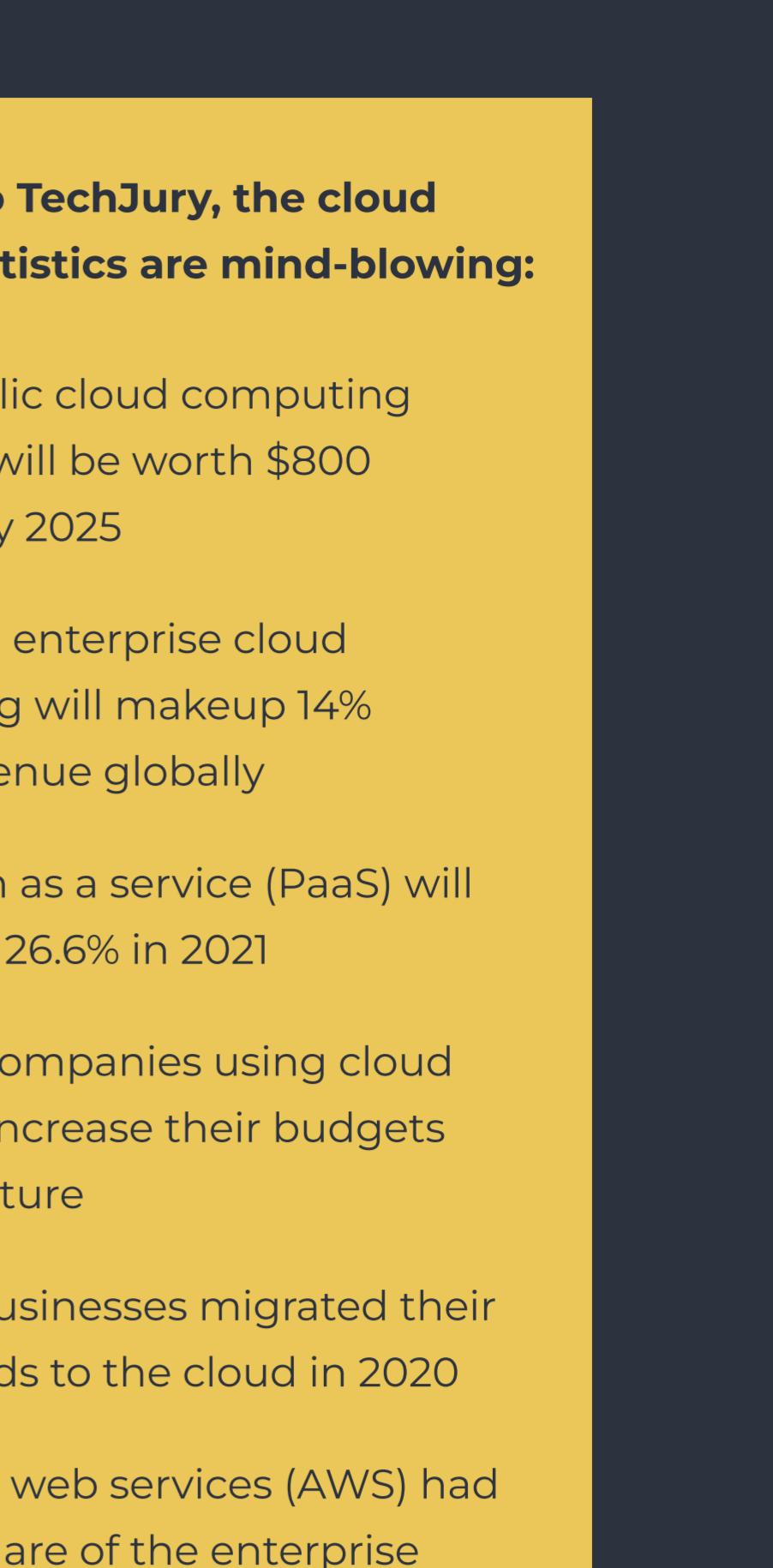


# Data Migration Testing: Purpose, Test Strategy And Scenarios

The reasons why businesses decide to migrate data vary: reduce costs, enhance scalability and flexibility, add security, enhance collaborative work, system upgrades, etc. But, whatever the reasons, Data Migration goes well beyond transferring information from one source to another. It is a complex process that requires expertise, skills, and – obviously – the right tools. The bigger the amount of data, the more challenging and complex the migration process will be.



## What is Data Migration Testing?

In simple terms, data migration is a process that consists of moving data, application, and other elements – either manually or automatically using migration tools – from a source platform to the destination one. Usually, legacy systems are either replaced or expanded by new applications that share a common dataset.

The current tendency among businesses is to replace on-premises applications and infrastructures with cloud-based applications and storage. And there are good reasons behind this decision.

**According to Microsoft Office 365, the benefits of cloud environments 'stack up' for small and medium-sized businesses:**

- 94% Small businesses that report security benefits since moving to the cloud
- 59% Small businesses using cloud services that report significant productivity benefits from IT
- 30% Small businesses not yet using cloud services that report significant productivity benefits from IT
- 82% Companies surveyed that reduced costs as a result utilizing cloud technology
- 70% Surveyed small businesses that report reinvesting cloud cost-saving back into their business

**According to TechJury, the cloud adoption statistics are mind-blowing:**

- The public cloud computing market will be worth \$800 billion by 2025
- By 2024, enterprise cloud spending will makeup 14% of IT revenue globally
- Platform as a service (PaaS) will grow by 26.6% in 2021
- 70% of companies using cloud plan to increase their budgets in the future
- 61% of businesses migrated their workloads to the cloud in 2020
- Amazon web services (AWS) had a 76% share of the enterprise cloud adoption in 2020.

However, Data Migration Testing plays a crucial role and it's not risk-free. Migrated data is compared with original data, thus allowing experts to identify any possible discrepancies and fix errors.

## What is Validation Testing?

Data migration testing includes **Data Level Validation** and **Application Level Validation**.

### Data Level Validation Testing

is meant to verify if data has been migrated without discrepancies.

### There are various levels of verifications:

- Row counts (i.e. number of records to be migrated)
- Data verification (i.e. verify the accuracy of a migrated data sample)
- Entitlement verification (i.e. the verification of the destination database)

### The Application Level Validation Testing

implies the verification of the functionality of a migrated sample application to ensure its smooth running with the new database.

### This process implies various validations:

- Logging in to the new application and verifying a sample data set
- Logging in to the legacy system and verifying the accounts' status
- Verifying customer support access to legacy systems, or ensuring user access to legacy systems if the migration process fails.

## Migration Testing Types and Scenarios

These are the most common types of Data Migration:

### Application Migration

In this case, an entire application needs to be migrated from one platform to a new one. For example, migrating ASP.NET to Windows Azure or migrating an app to the cloud. Testing should include: identifying requirements and scope of testing, testing the flow in the legacy application and contrast it with the new one and – if necessary – test the new flow.

One testing scenario could be **migrate an application to new technology**.

In this case, experts should make sure that the app works correctly and that the new platform supports all the application's components without errors (e.g. plug-ins, paths, add-ons, etc.) it is important to make sure not only that old data is retained but also that new data functions correctly on the new platform.

### Server Migration

In this case, the server data and the configuration are migrated to a new server. Migrating HP Box to IBM Box could be a good example. When performing testing, experts should ensure compliance with the destination server and test data handling. It is important to make sure that there is no data corruption.

### Server Migration testing scenarios:

- Verifying request-response between server and the application
- Testing client-server logs for all actions
- Ensuring that the whole system passes testing

- Testing the stability of the environment and ensuring there are no connectivity issues

### Database Migration

In this case, all the data in an application's database is migrated to a new database. For the migration to be successful, it is necessary for the application to be stable and the data to be valid. RDBMS to a new RDBMS or to MongoDB could be two migration examples.

### Database Migration testing scenarios:

- Ensuring that the legacy database doesn't get updated during testing once migration is completed

- Making sure that table levels and the mapping at field don't change

- Verifying that all data has been migrated accurately

- Performing pre- and post-migration testing

### If the database is migrated to a similar type of database, the testing scenario should be

- Ensuring that the executed queries have the same results in the legacy and new databases and that the new database functions exactly like the old one

- Using an automation tool, ensure that the number of records is the same in both databases

- Ensuring that table structures, relationship and schema have not been altered

- Make sure that the new database provides connection to all the application's components (e.g. interfaces, server, firewall, etc.)

### OS Migration

#### This is probably the most complicated type of migration.

When an application needs to be migrated from an operating system to a new one, compatibility risks arise and many components (e.g. interface, configuration, etc.) might require re-designing.

### OS Migration Testing Scenarios:

- Ensure Software and Hardware compatibility

- Ensure performance is not affected on the new OS

- Ensure the whole system passes testing

Here are some examples of re-designing: Windows to Linux, migration to Cloud-based VMs, or migrating to SaaS. Testing should include the analysis of the new OS's dependencies and see how configuration modifications influence the application. Since flow might vary, Extensive Testing and Compatibility testing are mandatory.

## The common mistakes in Data Migration

We have already seen that data migration is a complex process prone to mistakes. Undoubtedly, the risk of data corruption and loss increases dramatically during migration. According to Hosting Tribunal, the consequences of data loss can reach a dramatic dimension:

40%-60% of small businesses won't reopen after data loss

Small businesses are set back \$8,000 for an hour of downtime

The annualized failure rate of hard drives for the third quarter of 2020 was 0.89%

The average cost of downtime for large enterprises is more than \$1,600 per minute

The average cost of downtime for companies of all sizes is \$4,600/minute

Detecting breaches takes around 206 days

The average cost of compromised data in 2020 was \$3,86 million

2,013 data breaches occurred in 2019 alone

In 40% of the cases, the reason for data loss is a hardware failure

Human error is the cause of information loss in 29% of cases

Hence, avoiding data loss during migration plays a crucial role.

Here is a list of the most common mistakes business owners make when migrating data:

### Not removing legacy structures that are inefficient or obsolete

Before you begin the migration process, it is necessary to examine and decide what source data should be migrated. Migrating duplicates or errors can result in expensive failures. It's time to get rid of all the junk data.

### Insufficient or faulty testing and validation

Thinking that migration will run seamlessly is unrealistic. The only way to achieve your goal and save time and money is by performing testing throughout the entire process.

### Lack of expertise

Sometimes, business owners underestimate the complexity of the data migration process. Not to mention the challenges it poses. In order for a data migration process to run well, it is mandatory to count on the expertise of specialists who are able to quickly identify and fix data discrepancies.

### Leaving end-users aside

Before beginning a data migration process, there is one question that most business owners forget to ask themselves: "Who is going to use this data?" It is not always the IT specialist, that's for sure. So it is important to engage all the end-users in the migration process to avoid uncountable support requests and downtimes once the migration is completed.

## How can Test Automation benefit Data Migration?

When it comes to testing, quality is paramount. But so is speed, especially if you want to reduce risks, identify errors earlier, reduce system downtime, save time and costs, and, thus, speed up your business' development.

Since the migration needs are different, automated migration tools differ as well.

Altexsoft analysed four of the best available Test Automation tools:

	Deployment	Key features	Pros and cons	Pricing
<b>Astra Centerprise</b>	On-premises Windows Platform	Job scheduling Job orchestration Data profiling Data validation Parallel-processing ETL	Plethora of features and connections Drag-and-drop UI Best customer service Issues with metadata Lack of cloud options	From \$30k per year Free trial No free version
<b>Talend</b>	Cloud-based Windows, and Mac OS platforms	Job orchestration Data profiling ETL Debugging Data governance	Plethora of features and connections Effective profiling Impressive data migration speed Fee-based and sometimes fruitless tech support	From \$12k per user/year 14 days free trial 900+ free components
<b>Informatica Power Center</b>	On-premises, Cloud-based Windows Platform	Workflow management Repeatable data audit and validation Parallel-processing ETL Load balancing	High speed of data transformation Unrivalled performance when moving large datasets Long learning curve Inflated pricing	On request 30 days free trial No free version
<b>Starfish ETL</b>	On-premises, Cloud-based Windows Platforms	Workflow management Backup recovery ETL Testing Reporting	Intuitive UI Advanced support of scripting languages Many pre-built migration maps Detailed error-reporting Run only one migration at a time Tech background required	From \$495 per migration Free trial No free version

Keep in mind that test automation doesn't mean you will no longer need a specialist to plan, supervise, and validate the migration process. A tool's efficiency only goes as far as the expertise of the person using it.

## To sum up

Data migration to newer and more performant systems allows businesses to transform and improve their ecosystems and grants them advantages over their competitors. However, the data migration process is complex and error-prone.

Using the right strategies and tools at the right time and avoiding common mistakes is the only way to ensure the success of the migration process.