



READY. SET. MIGRATE.

An Overview of Common Cloud Migration Methods



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You've made the decision to move to the cloud, and

determined the appropriate cloud service and delivery models.

Most likely, it's a public, private or hybrid cloud using Infrastructure as a Service (IaaS). You've vetted your cloud services provider (CSP) to ensure it can deliver the required connectivity, security, availability, and support. You've read your Service Level Agreement (SLA) line-by-line, and understand everything and how it could or does impact your data during and after migration.

Your data has been audited to help ensure you don't transfer outdated or corrupt data into the cloud. Application dependency mapping is completed, and you've conducted application profiling to identify the

applications that make sense for migration or should have priority. You know which tools are required to test, remediate and convert applications for the new target system.

Now it's time for the real fun: the actual migration of your workloads to the new cloud environment. But there are still a few more things to think about and do. The pages that follow provide a general overview of your next steps.

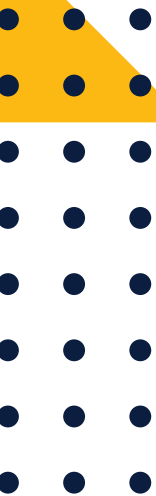
FIRST THINGS FIRST

The migration methodology you use for moving workloads to the cloud will depend on several factors, including the cloud solution, the CSP you're working with, and your organization's business requirements.

These are just a few of the variables to consider:

- + **Distance:** How far are you from your designated cloud infrastructure?
- + **Manpower:** Who will be handling the migration — your internal staff or your CSP? If it will be your internal staff, do they have both the time and expertise required? If your CSP is handling the migration, does it have a track record of successful migrations? Has it communicated to you clearly what you need to do on your end to make the migration successful?
- + **Transport:** Will you be migrating data over the Internet or Ethernet, or physically transporting it?
- + **Cost:** Will the migration process require you to pay for a courier service, Internet bandwidth, software, experienced labor or possibly conversion or migration tools? Have you built in contingencies into your budget to cover unexpected issues that may arise?

MIGRATION REQUIREMENTS



- + **Risks:** Will the number of servers increase the complexity of the job? Do you have enough bandwidth? Do you have a long enough window for completing the task? How will you protect your data while it is in transit? Will latency be an issue? Do you have the internal IT resources?
- + **Size:** How large is your server infrastructure? What migration methodologies are most appropriate based on the size of your workloads?
- + **Format:** Do you plan to transfer workloads in your native format, or will you convert over to your CSP's format?
- + **Application dependencies:** What applications are you migrating? What are their immediate dependencies? What applications are dependent on those applications' dependencies?
- + **Node-level data:** For each node on which the application runs, what is the CPU usage, memory usage, storage data (such as throughput, latency and input/output operations per second) and network data (such as throughput, connections per second and dropped connections)?
- + **Profile user activity:** What is your total number of connected users, request and transaction rates, and request latencies?

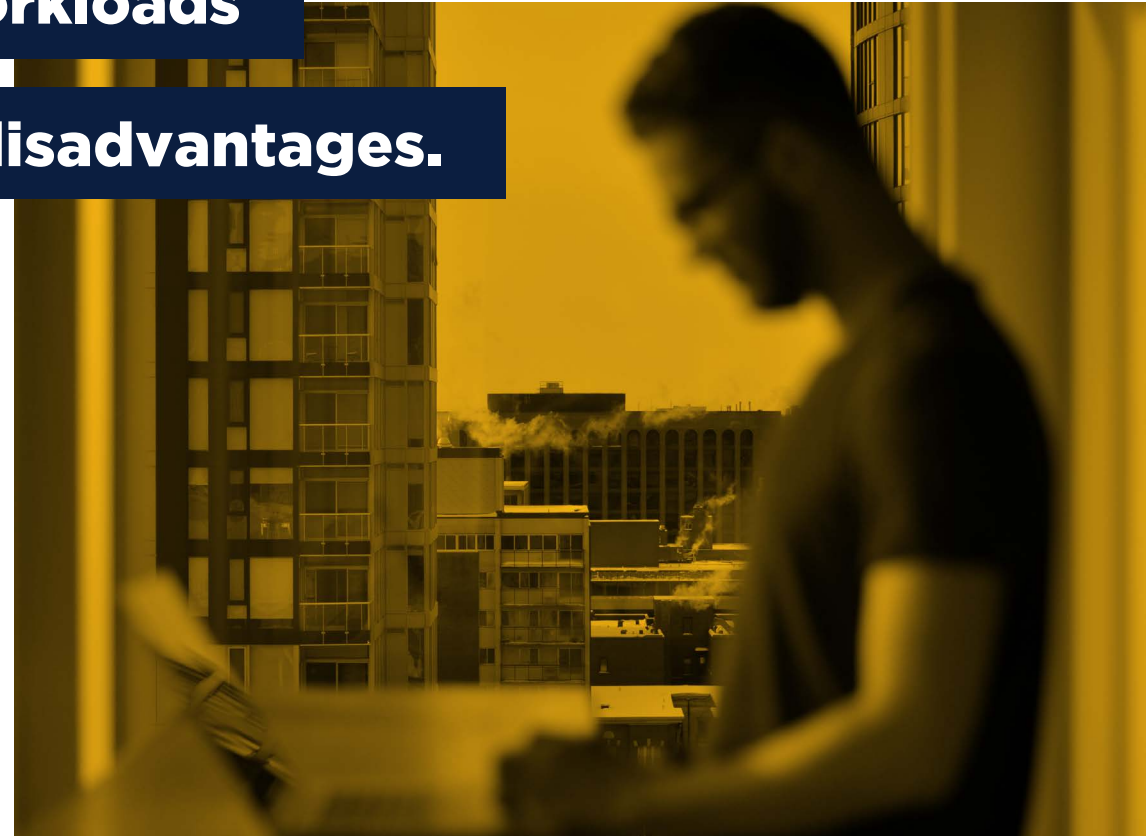
CONT. MIGRATION REQUIREMENTS



There are various methods for moving workloads to the cloud, each with advantages and disadvantages.

Your migration requirements (based in part on your answers to the questions on the previous page) will help determine which one is best suited to your needs. Common migration methods include:

- + Manual data migration between your existing operating system and application environments and the CSP's environment
- + Offline media transfer via shipping portable media
- + Internet transfer of virtual disk images
- + Software agent-based data replication between your existing operating system and application environments and the CSP's environment
- + Full server replication from the existing operating system and application environments and the CSP's environment using software agents

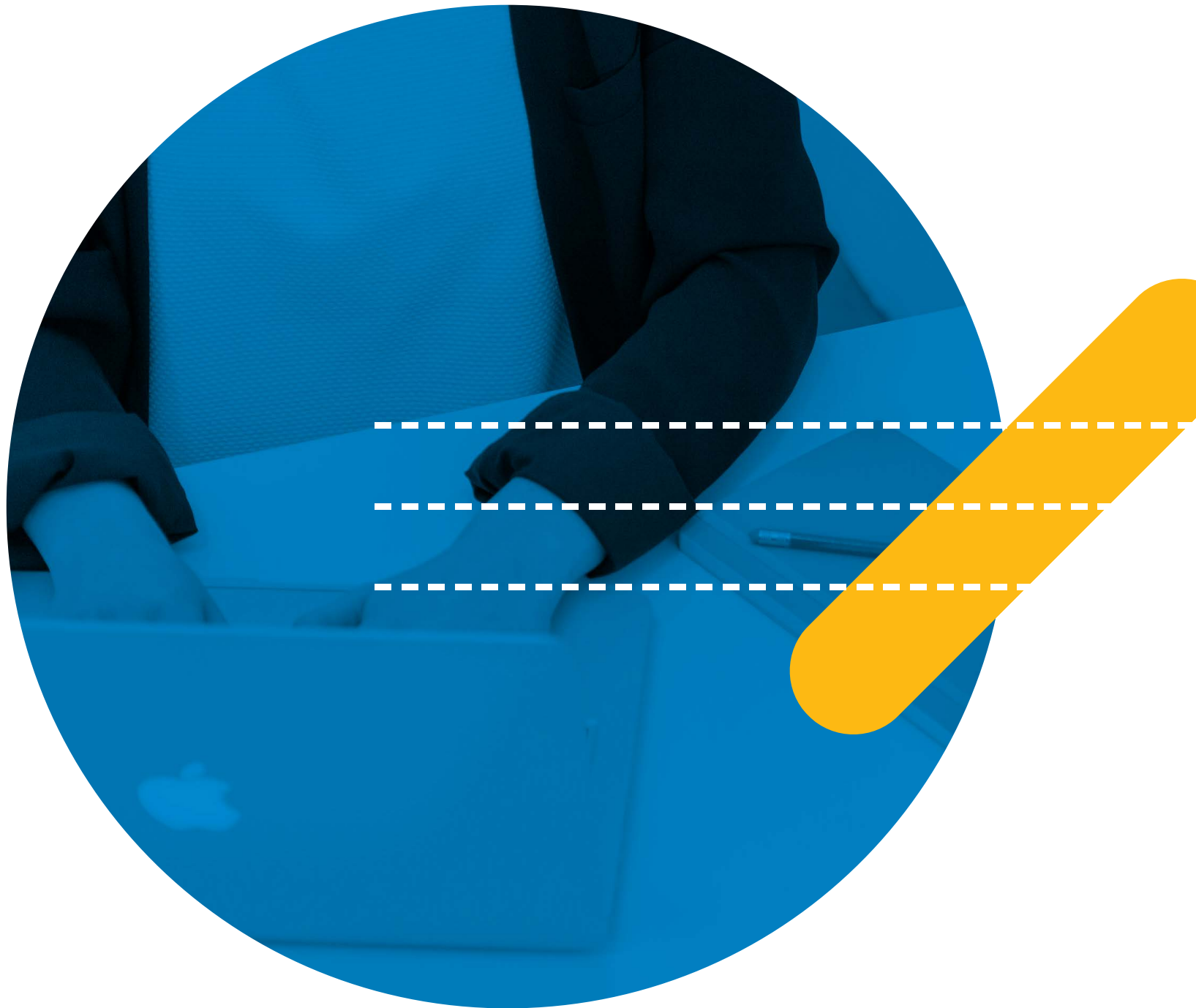


COMMON MIGRATION METHODS

A brief overview of each of these migration methods appear on the pages that follow. Who handles the migration may play a role in the methodology best suited for your project. Your IT team can handle it, but has your team ever handled a cloud migration? If they have, when was the last time they completed one? Are they up to date on the latest cloud technologies and best practices? Do they have the time to dedicate to what may be a lengthy project? Or, you can choose to enlist the CSP to assist with or handle the migration. Many organizations lack the time, expertise and internal resources to handle a migration. Outsourcing the task to the CSP's Professional Services team can relieve much of the burden and help ensure a smoother transition.

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COMMON MIGRATION METHODS



Manual migration is a cost-effective way to move data to a new cloud environment. It can be performed using migration tools already built into your operating system or application.

For example, the Windows server OS includes the file replication command Robocopy (Robust File Copy), as well as SQL Backup, for creating a back-up copy of a SQL database. For Linux, there is mysqldump and rsync utility software.



MANUAL DATA MIGRATION

Data is transferred over the internet, so the distance to the new cloud environment isn't an issue. However, even if the bandwidth is 1 Gbps pipe, it would likely take more than two hours to transmit 1 TB of data. That means if you have a lot of data to move, the process could take months.

Manual migration is typically best for one or two simple applications that don't have many dependencies or require custom configurations. It's not recommended if you must install several additional software components just to get an application running. This is also the case if you don't have the installation media for the apps, or you "inherited" the app but not the documentation or knowledge transfer.

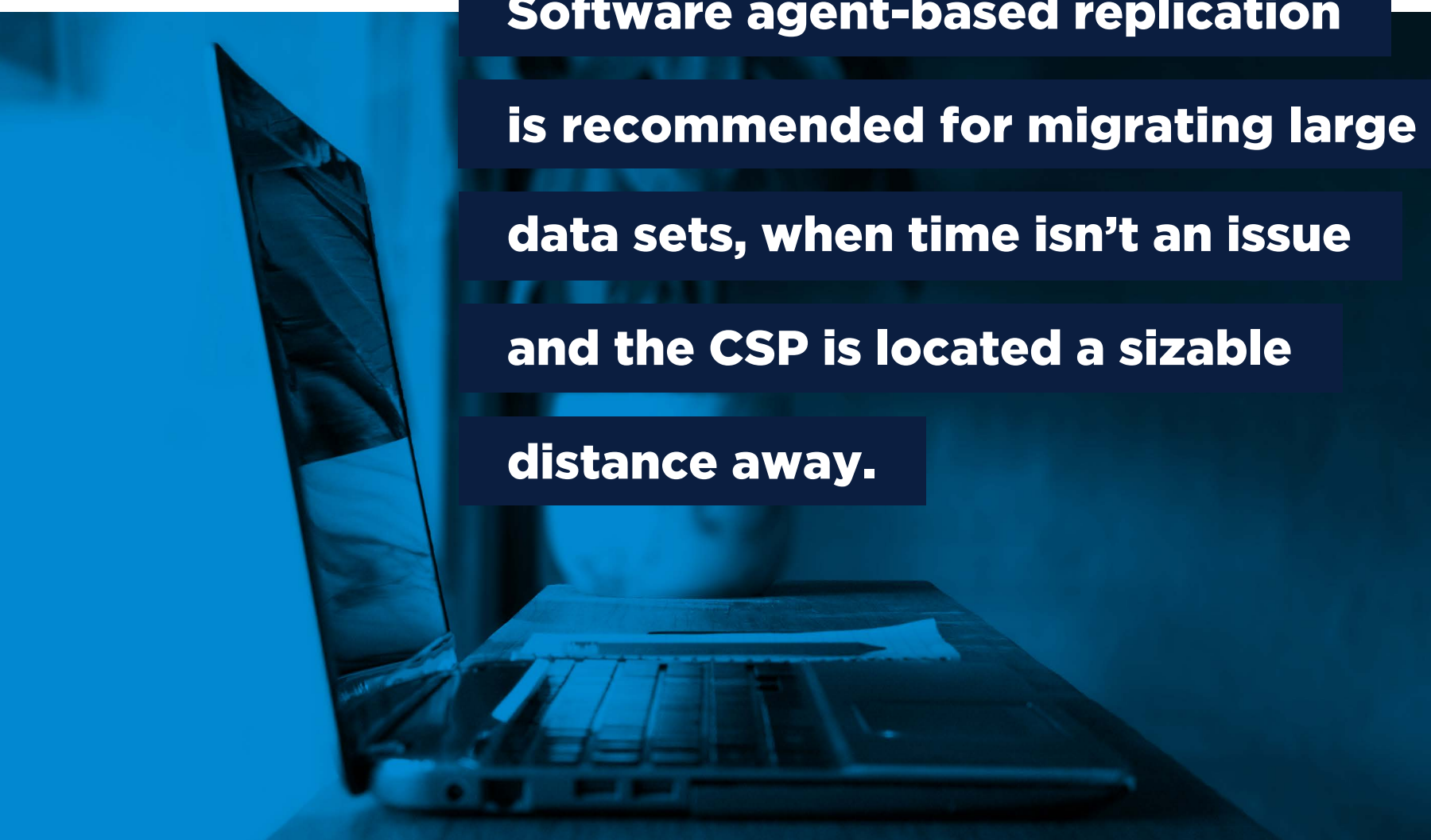
It's also not a good option for applications with short Recovery Point Objectives (RPOs). The more data to be copied, or the smaller the Internet connection, the slower the migration process will be. If data is still coming into the source system while being copied, it can be lost. To avoid data loss, you should be able to complete the final cutover under normal maintenance window conditions.

The most significant risk you'll likely face is that your data will be in flight, leaving it vulnerable. With this or any other migration method, always encrypt your data. The encryption used by Secure Shell (SSH) network protocol provides confidentiality and integrity of data over unsecured networks, such as the Internet. Using a VPN tunnel or a private network like MPLS to transfer sensitive data is best practice.

If you opt for manual migration, conduct a practice run before placing workloads into production. Then, test thoroughly to ensure that everything that was supposed to migrate did.

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MANUAL DATA MIGRATION



Software agent-based replication is recommended for migrating large data sets, when time isn't an issue and the CSP is located a sizable distance away.

The minor latency caused by network and distance is inconsequential.

You can use data replication tools such as Double-Take to replicate without prolonged system downtime. Install the replication software on the old server and the new destination server. Let the data trickle through during business hours when internet usage is at its peak. During slow periods, it can flow freely. All the while, production servers continue to run. You can maintain this sync state indefinitely.

When the new server catches up with the old server, stop the replication and test the new server. Restart the synchronization until the new server catches up with the old server again. When replication and testing are complete, you can failover to the new environment.

SOFTWARE AGENT-BASED DATA REPLICATION

There are more costs associated with this method than many of the alternatives, including for the software and for the expertise required to manage it. In addition, internet bandwidth at both ends must be properly sized to keep up with the rate of exchange. And the more servers, the greater the complexity. However, risks are low because you can stop the replication process and test any time.

The maintenance window is short. The actual failover process doesn't take long. However, unexpectedly large changes to source-system data, as can happen with disk defragmentation programs, will restart the process. In some cases, the two systems may never be able to reach parity without changing the conditions.



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SOFTWARE AGENT-BASED DATA REPLICATION

With this migration method, you capture everything installed and configured on the source system and move it in its entirety to the CSP's environment. You can replicate to a shell VM, agent to agent or to an aggregated target such as a VM appliance.

There are many similarities between full server failover and software agent-based replication. Both allow you to migrate heterogeneous environments. Both are non-disruptive to the production environment, replicating over time without bringing your systems down for prolonged periods.

The server image replication moves slowly during heavy Internet use and at full speed during off-hours. You can test at any point in the process and as often as desired until the target site is completely in sync with the source. Any latency caused by network and distance will be minor.

A key difference is that the target server is a complete duplicate of the source server. No rebuilding or reconfiguring or dependencies should be expected, and you don't have to worry about missing installation media or configuration work-arounds. The complete server package is there. This method is particularly good for large numbers of servers, and it scales well.

FULL SERVICE FAILOVER USING SOFTWARE AGENTS

Once you've selected the migration method, develop your migration work plan and tests for the actual migration.

These will vary based on the types of applications you're migrating and their business continuity requirements. The data collected during the earlier application dependency and profiling processes will help you create test suites and simulate different user types and loads.

Make sure to develop a test response plan. You'll be testing for inefficiencies and will also need to be prepared to address privacy and security concerns during the move. Develop tactics for dealing with test results.

Be sure to use non-critical data when testing the capabilities of your new cloud environment.

With your methodology chosen and your test plans in place, start your migration. You may choose to migrate your applications in phases. You may also choose to keep both existing and migrated apps available for awhile. After initial tests, you can also migrate your users in batches. The beauty of the cloud is that capacity can be increased as needed and when needed.

PLAN. TEST. MIGRATE.



When you're ready to move to the cloud, let US Signal help you make a successful trip.

Cloud Migration Professional Services

With US Signal's cloud migration services, you can free up your IT resources and gain peace of mind knowing experts are handling your cloud migration. US Signal's Professional Services team will work with you to prepare for the transfer of your data and apps to the cloud, and then handle the actual migration from almost any physical or virtual environment directly into the US Signal cloud. The team takes care of destination environment configuration,

migration process monitoring and confirmation of connectivity once migration has concluded. Additional consulting and related services are also available.

Learn More

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US SIGNAL CLOUD MIGRATION SERVICES

