FORWARD THINKING IT SOLUTIONS

WHITE PAPER

Ergonomics Cloud Services

V1.0

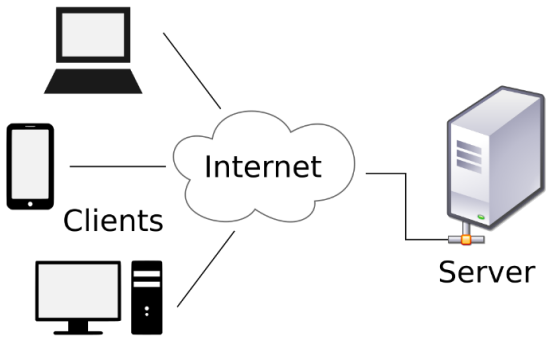
1 Abstract

This whitepaper gives a short overview of Cloud Computing. We highlight the common challenges when transitioning to Cloud Computing, and show how Ergonomics can support you indifferent scenarios and options of outsourcing traditional in-house IT services to the cloud.

2 What is Cloud Computing?

Engineers use the cloud symbol on diagrams to indicate unknown parts, or parts that are being taken care of by someone else. This is exactly the core of the Cloud Computing idea: somebody else takes care of your computing needs. Obviously computing involves computers, but their management can be delegated to a third party service, which offers dedicated services for our computing needs. Note that we are talking about **computing, not computers**. Note that moving the computing responsibility also shifts all prerequisites and side-effects: power, cooling, space, fire-suppression, physical access security, networking, installing hardware, purchasing hardware, deploying to new hardware, capacity planning, update management, information security, incident response, redundancy, infrastructure renewal, building maintenance, marketing, billing, legal, customer relations, technical support.

Most provider offer Cloud Computing services besides plain old hosting and co-location services. This adds to the pervasive confusion about the definition of Cloud Computing and consequently about the pros and cons of Cloud Computing.



Cloud Computing providers create services that maximize convenience for their customer with the aim that their customers consume the provider's pool of resources efficiently. The feature sets and price list of Cloud Computing providers look very different compared to that of co-location providers or IT departments. The much touted cost-savings stem from the shift of in-house operations to the provider for services where the provider enjoys economy of scale. Naïve transitions to Cloud Computing often increase overall costs due to customer requirements not matching the different economy of scale factors of a provider's services.

The architectural tradeoffs when moving to a Cloud Computing model require an honest and detailed discussion of a business' competencies, value creation, and acceptance of risk. A solely technical discussion is not enough.

Summary: Cloud Computing allows not to worry about resources (computers) through outsourcing dedicated services (computing) to third parties.

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3 The Serverless Soul of Cloud Computing

Serverless is often described as the next step of Cloud Computing. It is a marketing term for services that capture the spirit of *computing not computers*. Obviously there are still servers somewhere, but the customer is neither required to nor able to care about them. Serverless offerings are pay-per-use, infinitely scalable, and always on. They remove capacity planning, uptime, and to a large part incident response from your responsibilities. In practice, these services are provided through APIs without any visibility into underlying operational concerns.

Here are some examples of Serverless offerings and their billing:

- Object Storage (billed based on GB/Month)
- Message Queues (billed based on Messages/Month)
- Databases (billed based on Queries/Month)
- DNS (billed based on Zones and Requests / Month)
- Network Usage (billed based on GB / Month)
- Centralized Logging (billed based on Lines / Month)
- Continuous Integration (billed based on Build Time / Month)
- Compute (billed on based on CPU time * Memory use * Invocations / Month)
- CDN (billed based on GB / Month)

Cleverly integrating Serverless services into an architecture increases flexibility, avoids performance bottlenecks, reduces cost, and allows optimal scaling in accordance with anticipated business growth, and traffic peaks. Most of all it simplifies operations.

It is vital to understand each service's trade-offs since they are reflected in performance and pricing. For example, Serverless SQL databases remain costly because the underlying management load and resource needs are less scalable than for example object storage.

Summary: Serverless describes offerings where the customer is not involved with server operations and cannot influence uptime (other than through coding). The goal of Serverless architecture is to combine services in such a way to gain the most performance for the smallest price tag.

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4 Hybrid Operations and Containers

Most companies require some traditional hosting while wishing to maximize the use of managed services. As a rule of thumb, only heavily adapted applications or green-field applications will exclusively utilize Serverless offerings.

The implementation of mixed models requires a good understanding of the application in question and knowledge about a provider's offerings in order to find the optimal balance on the route to a Serverless model. A first step available for any existing application is to repackage it into containers to make use of managed compute, storage, and networking capacity. This adds automatic recovery, centralized monitoring, and some pay-per-use scalability to legacy applications.

The foremost tool to run containerized applications is the Kubernetes orchestrator. Kubernetes is essentially a robot system administrator. It takes descriptions of what should be running, ensures that these services are running across a pool of servers, takes care of restarts, rollouts, rollbacks, and generally prevents people from messing with the underlying servers by hand.

All major Cloud Computing providers have managed Kubernetes offerings. They ensure cluster uptime and integrate storage, monitoring, and load-balancing within their Kubernetes offerings. The customer is left with packaging your applications, and writing task definitions. Many providers offer variants where the underlying server pool grows and shrinks with the workload.

There are many projects attempting to bring Serverless experiences to the Kubernetes world. Some attempt to replicate Serverless services to Kubernetes clusters by letting the Kubernetes orchestrator handle the operations parts. Other projects attempt to make a provider's Serverless offerings configurable through Kubernetes.

Summary: Repackaging legacy applications to run them on Kubernetes increases reliability, improves resource efficiency, and can be done with virtually any application without requiring major changes. Kubernetes is becoming a bridge between Serverless and the traditional world.

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5 What can Ergonomics provide?

In the domain of Cloud Computing, Serverless and Kubernetes Ergonomics will support you with:

- **Cloud Architecture Consulting**
  We review and guide your architecture around the use of cloud computing. We good practices are followed and provide you with a sparring partner for difficult trade-offs.

- **Business Alignment and Provider Selection**
  We listen to your needs and help you understand the impact on your computing needs. We then help you select cloud computing providers that best align with your plans.

- **Architecture and Source Code Reviews**
  Independent of whether your software is cloud-ready or not, we review it and provide an outside perspective into your development department.

- **Containerize Applications**
  We take your existing applications, package them into containers, and provide the necessary configuration for the applications to run on Kubernetes.

- **Adaption of Applications for the Cloud**
  We take your existing Java and C/C++ applications and get them Cloud-ready. This ranges from replacing parts, e.g. replacing storage on disk with an object store, to porting entire application parts to Serverless services.

- **Serverless Design and Development**
  We design and implement green-field applications using the Serverless paradigm.

- **Performance Testing**
  We run performance tests, soak tests, and spike tests against cloud and on premise apps.

- **Monitoring**
  We monitor your cloud applications for you. Thanks to our extensive experience monitoring on-premise applications, we feel at home no matter the environment.

- **Managing Cloud Accounts**
  We can act as a trusted 3rd party to small companies with limited IT staff to ensure good practices are followed and provide continuity support when staff leaves.

- **Hardware Security Modules**
  We provide consulting and development around HSMs on premise, in the Cloud or in a hybrid mode, to ensure your data is protected no matter where.

- **Payment Card Industry (PCI) Audit and Certification**
  We analyze and certify your cloud architectures and applications in regards to the payment card industry security standards.

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6 Success Stories

Design, implementation and operation of a platform to offer and book parking places in Switzerland, including design, implementation and deployment on Google Kubernetes Engine (GKE) for Touring Club Schweiz (TCS). The application is designed to be fully operated in the Cloud, scale to the anticipated traffic and beyond while keeping costs and workload minimal.

Implementation and operation of a gateway to forward international reservations on booked seats for multiple touristic train companies in the Swiss Alps. The application is designed to be fully redundant by combining hosted services, and managing transparent failover, session management, data synchronization and recovery across two independent data centers.

7 Conclusions

Transitioning to Cloud Computing severely affects the solution design of your IT projects. If the implications are not well considered, Cloud Computing might increase system complexity, costs, missed project goals and results in increased frustration.

Ergonomics is your partner in any phase of your Cloud Computing projects, starting with initial consulting over architecture and design up to final implementations, accompanied by on-going quality management.

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