

“Cloud Computing Patterns & Best Practices”

Ezhil Arasan Babaraj
Director of R&D Labs CSS Corp, India





About CSS Corp



- Recognized leader in Technology Operations Management with CoEs in Telecom, SaaS, Cloud, RIM, Testing, Support and R&D
- Strong Partner Ecosystem; AWS, Microsoft, IBM, HP
- 150+ Long Term, Strategic and Profitable Customers
- Operations in USA, UK, Poland, India, Manila & Singapore
- Technology Platform for DC Mgmt, Cloud Computing etc

Company DNA

- 100% Referenceable Customers
- Driving Technology Innovation and adoption
- Technology OpEx Optimization
- Transparency, Openness & Flexibility
- Independent Centers of Excellence for R&D, Testing and Support

Key Differentiators

- Passion for Advanced Technology Operations & Support
- Dedicated CSS Labs for Technology Innovation
- Business Operations and Technology Optimizer
- Out-comes based pricing models
- Top Mid Market ITO Provider 2007,2008,2009 – DataMonitor

High Growth, Profitable Company

- Privately held by investors including Goldman Sachs, SBAIF, Sierra Ventures
- 5,000+ Resources
- Market Validation – 100% Client Retention
- Completed 3 acquisitions in 2010



CSS Corp Credentials



Hybridfox

20,000+ Downloads

CSS CORP
**RANKED
TOP 250** 2010

CLOUD COMPUTING
PLAYER BY
CLOUD COMPUTING JOURNAL



CloudBuddy Personal

7,000+ Downloads



CSS Corp Labs – Intellectual Property

Cloud Computing

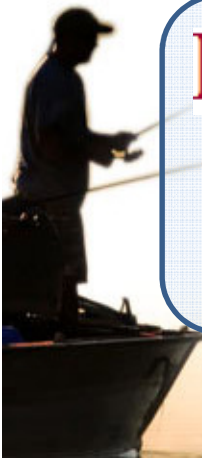
Cloud Smart, Cloud Vault, CloudBuddy Enterprise, Hybridfox, CloudBuddy Personal, CloudBuddy Analytics, {A}Record BETA

Mobile Technology

SRTS, Remote Phone Book, BlackBerry Chart Framework, MobileWeb Platform, Qwiknote

Other Tools & Frameworks

EasyWEB, tulip, spinneret, Lotus Wizard, Single Sign On



A silhouette of two fishermen on a boat, one holding a fishing rod, against a golden sunset background. The scene is peaceful and captures the end of a day on the water.

INTRODUCTION TO CLOUD COMPUTING



Definition

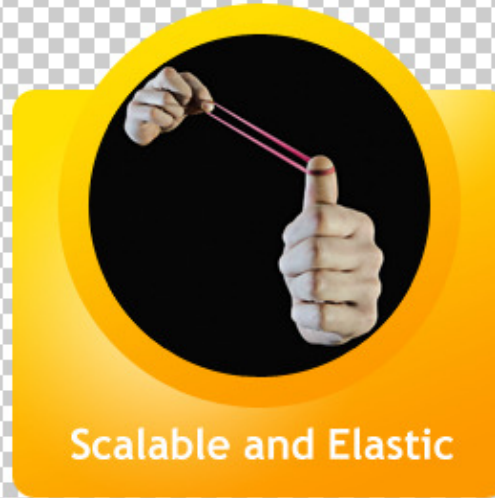
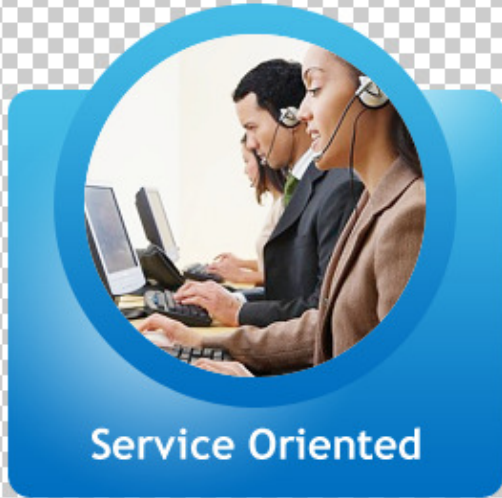
“Cloud Computing is a style of computing in which **scalable** and **elastic IT-enabled** capabilities are **delivered as a service** to external customers **using Internet technologies**”



Gartner®



Characteristics





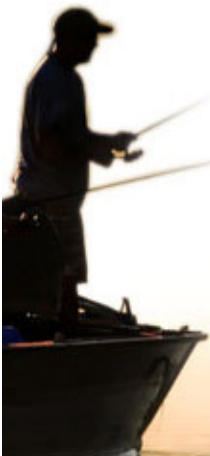
Myths about Cloud Computing





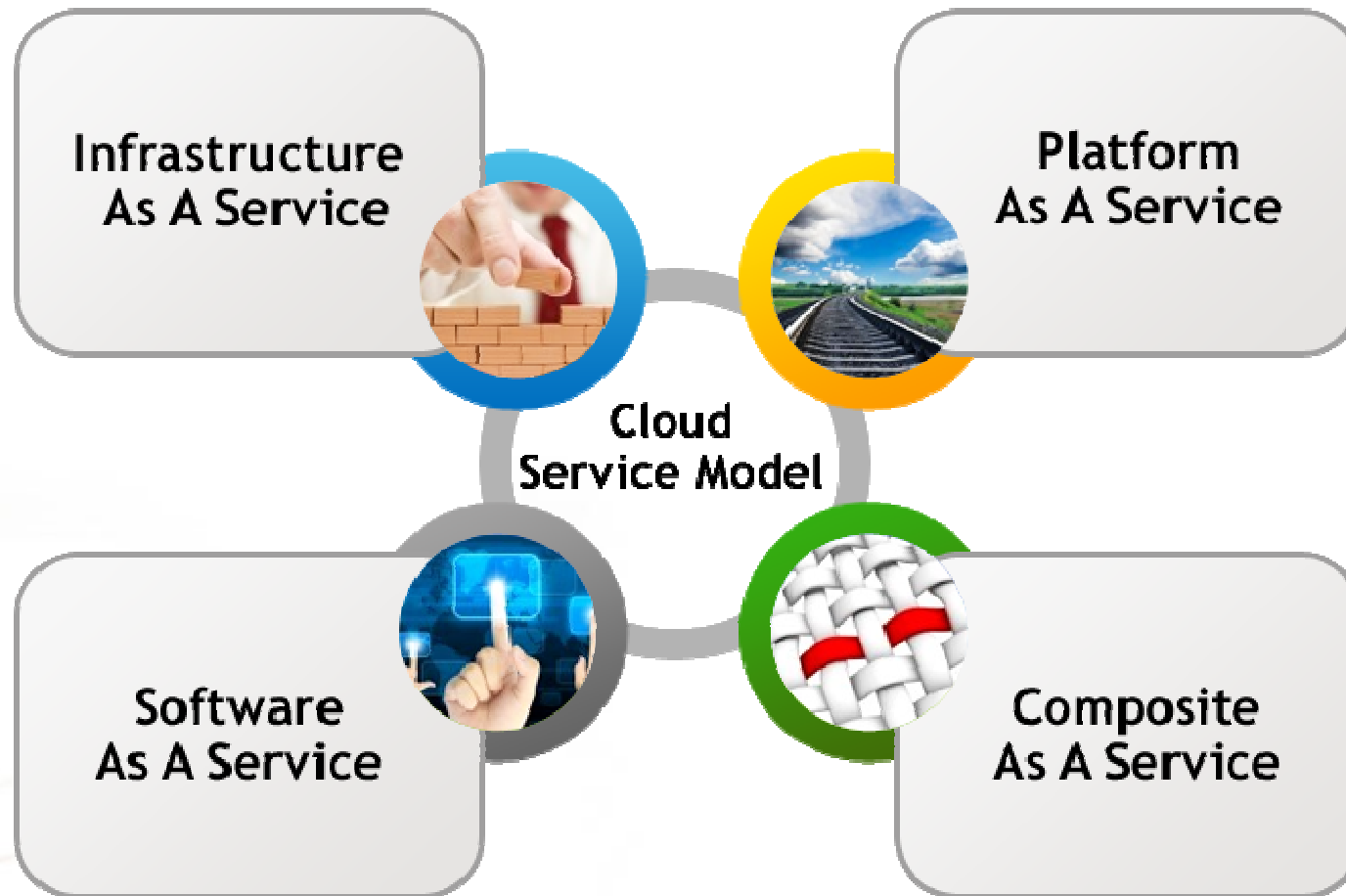
Advantages

- No upfront Investment
 - CapEx converted into OpEx
- Embrace Innovation
- Allows you to focus on your business
- High Tech at an Affordable Price
- Maintenance of Infrastructure/Platform/Software no longer YOUR worry



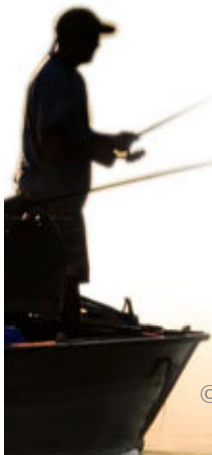
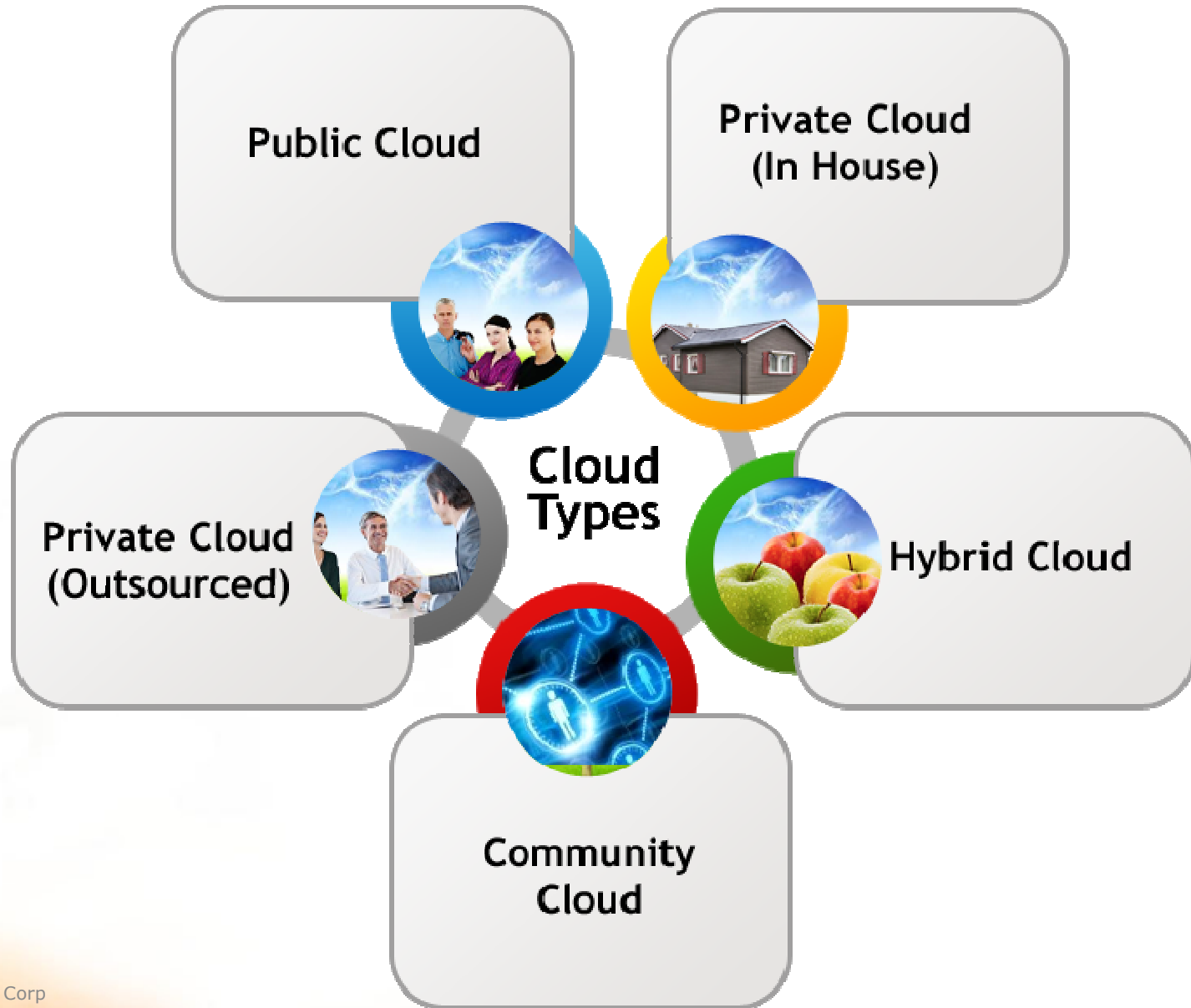


Cloud Service Model





Cloud Types





Cloud Building Blocks

Compute Services

- Elastic Infrastructure
- Low Availability Computing Node
- High Availability Computing Node
- HPC and Gluster Compute
- Auto Scaling
- Cloud Monitoring
- Map Reduce

Storage Services

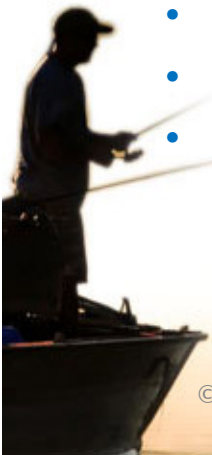
- Strict Consistency
- Eventual Consistency
- Relations Data Storage
- Blob Data Storage
- Block Data Storage
- NOSQL Storage

Communication Services

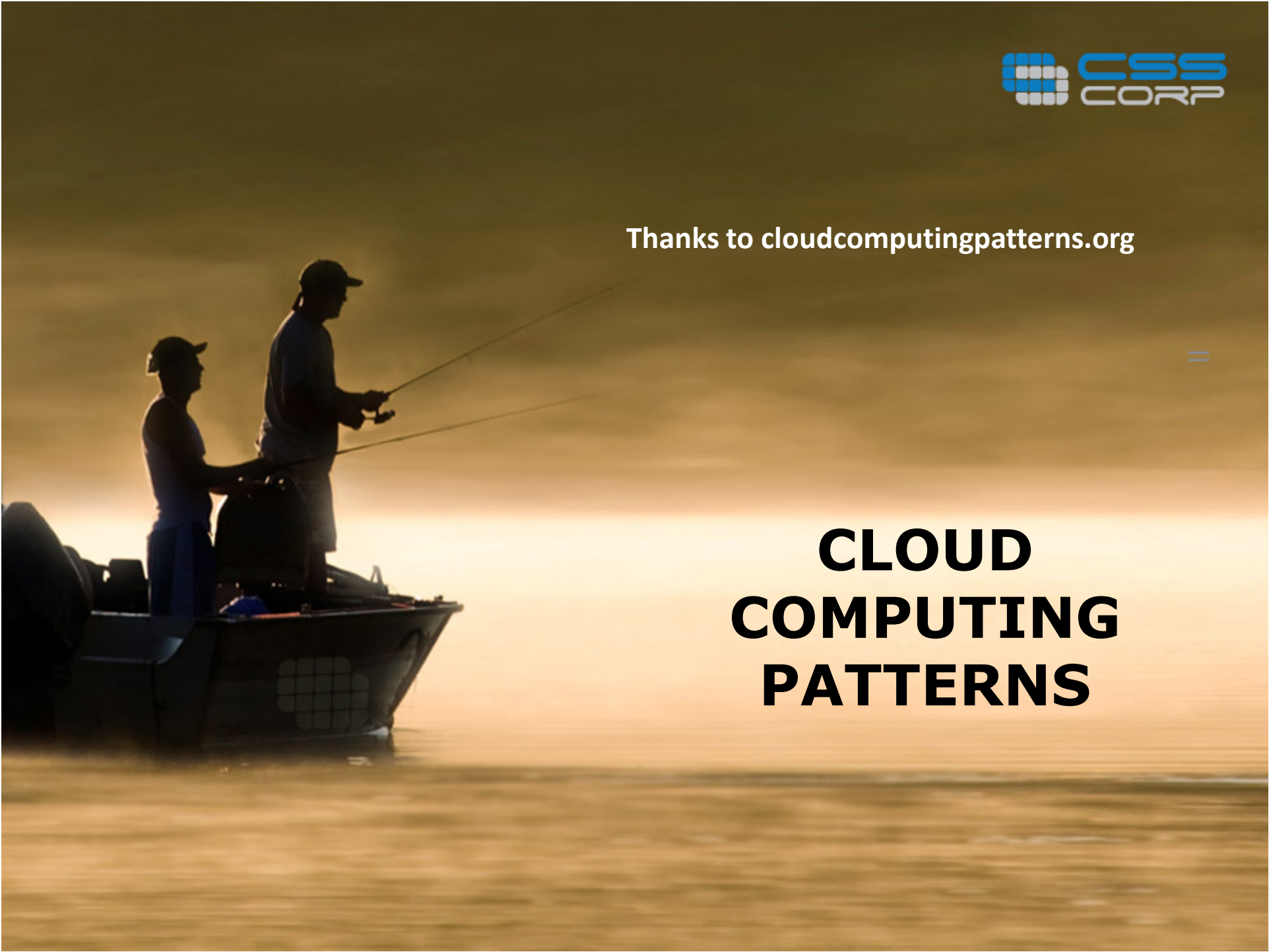
- Reliable Messaging
- Message Oriented Middleware
- Exactly Once Delivery
- At least Once Delivery

Network & Security Services

- Elastic Load Balancers
- Virtual Private Cloud
- Firewall Services



Thanks to cloudcomputingpatterns.org

A silhouette of two fishermen on a boat, one holding a fishing rod, against a sunset background. The scene is captured in a low-angle shot, emphasizing the horizon line.

CLOUD COMPUTING PATTERNS



Architectural Patterns

Basic

- Composite Application
- Loose Coupling
- Stateless Component
- Idempotent Component

Elasticity

- Map Reduce
- Elastic Component
- Elastic Load Balancing
- Elastic Queuing

Availability

- Watchdog
- Update Transition

Multi-Tenancy

- Single Instance Component
- Multiple Instance Component



A silhouette of two fishermen on a boat, one holding a fishing rod, against a golden sunset background. The scene is captured from a low angle, emphasizing the horizon line.

BASIC ARCHITECTURAL PATTERNS



Composite Application

Problem

- User Interface is tightly coupled with business logic
- Web Page or the forms logic built is not be able to expose as a web services
- Most used functionality is not distributable

Disadvantages

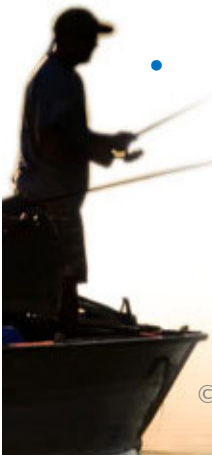
- Too many components brings communication overheads
- Too few components loses its flexibility

Solution

- Divide your application logic as multiple components
- **Application Component deployment can be scaled out with Auto Scaling**
- State can be shared through a context
- Use composite languages such as BPEL to build apps

Cloud Building Blocks

- Elastic Infrastructure
- Elastic Load Balancers
- Auto Scaling





Loose Coupling

Problem

- In general, Component dependency is high
- Exchange of information needs to be minimized
- Communication is mostly synchronized

Disadvantages

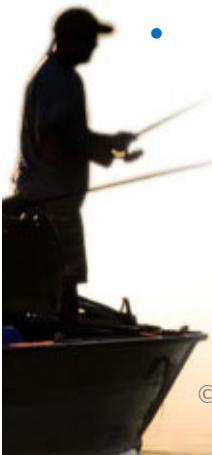
- Performance reduction due to asynchronous communication
- Communication path is longer due to address resolution, format transformation...etc

Solution

- Reduce/Remove assumptions about the other component during information exchange
- **Components communicates asynchronously with an intermediary**

Cloud Building Blocks

- Elastic Compute
- Elastic Load Balancers
- Message Queue Services





Stateless Component

Problem

- Failure of a component in a distributed world is high
- In Cloud it is further increased
- **Instance of a Component needs to be Auto scaled**

Solution

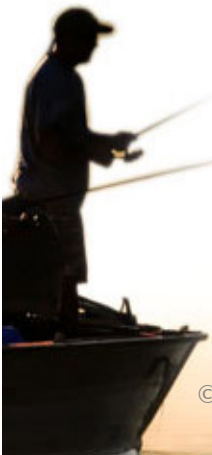
- **Do not maintain state within the component, externalize it**
- Single Data Store for persisting state
- State can be shared even via the Context

Disadvantages

- Single point of failure at the data store

Cloud Building Blocks

- NoSQL db services
- Scalable RDBMS services
- Cache Services





Idempotent Component

Problem

- **Component receiving messages needs to handle duplicates even in reliable delivery**
- To Support legacy applications that does not support coordinated transaction management

Solution

- Use unique message ID's while exchanging
- Build filters to ensure duplicate messages are identified
- **Design to perform same operations multiple times**

Disadvantages

- Need to build logic to eliminate duplicate message processing

Cloud Building Blocks

- Message Queue Services



A photograph of two fishermen on a boat at sunset. The sun is low on the horizon, creating a warm, golden glow over the water. The fishermen are silhouetted against the bright light, and their fishing rods are extended over the water. The boat is on the left side of the frame.

ELASTICITY PATTERNS



Map Reduce

Problem

- **Cloud Storage does not support complex queries**
- Big data or large data sets needs to be processed
- Need for parallel execution of queries

Solution

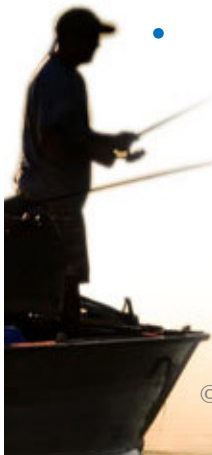
- Map the dataset into a smaller and distribute among multiple nodes
- **Execute the query to filter dataset**
- Reduce the resultset for consolidated resultset

Disadvantages

- Integrating RDBMS data with Map reducing is difficult
-

Cloud Building Blocks

- Map Reduce Service





Elastic Component

Problem

- Dynamic Nature of Elastic Infrastructure
- The application component provisioning
- **Pay per user translates to running/operational cost**

Solution

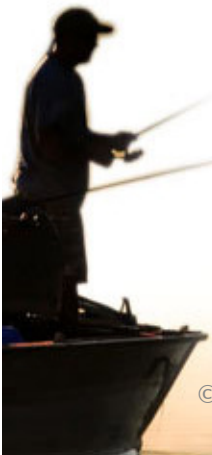
- Automate the application component provisioning
- Measure the performance of your application
- **Optimize the auto scaling parameters properly**

Disadvantages

- In efficient Auto Scaling leads to high expenditure

Cloud Building Blocks

- Elastic Infrastructure
- Cloud Monitoring Service
- Auto Scaling





Elastic Load Balancing

Problem

- **Work load distribution**
- Support for multiple protocols required
- Need to avoid single point of failure

Solution

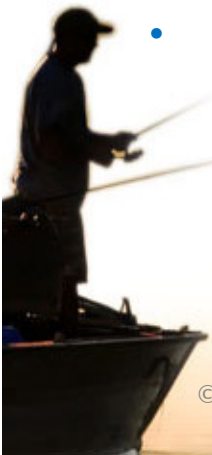
- Use Round robin, sticky session techniques
- **HTTP & HTTPS are the commonly supported**
- Use DNS capabilities

Disadvantages

- SSL certificate needs to be shared with the provider
- Zone apex issue

Cloud Building Blocks

- Elastic Load Balancer





Elastic Queue

Problem

- **Component receiving messages needs to handle duplicates even in reliable delivery**
- To Support legacy applications that does not support coordinated transaction management

Disadvantages

- Need to build logic to eliminate duplicate message processing

Solution

- Use unique message ID's while exchanging
- Build filters to ensure duplicate messages are identified
- **Design to perform same operations multiple times**

Cloud Building Blocks

- Message Queue Services



A photograph of two fishermen on a boat at sunset. The sun is low on the horizon, creating a warm, golden glow. The fishermen are silhouetted against the bright light. One fisherman is in the foreground, and another is slightly behind him, both holding fishing rods. The water is calm and reflects the light from the sky.

AVAILABILITY PATTERNS



Watchdog

Problem

- **Design for high availability with unreliable compute nodes**
- Architecturally Enable redundancy & Fault tolerance

Solution

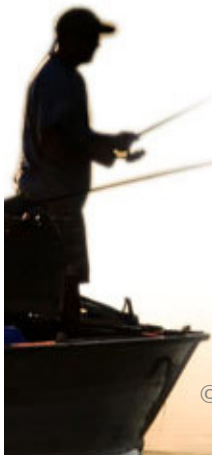
- Redundant compute Nodes performing the same functionality
- Use Message Queues to distribute the job
- **Build logic to identify the active node for processing**

Disadvantages

- Complexity in handling message queues and active node finding logic

Cloud Building Blocks

- Elastic Infrastructure
- Message Queue Services





Update Transition

Problem

- **Handling the component upgrades/updates in a large scale deployment**
- Crucial business component should not be unavailable during transition

Solution

- Deploy additional resources for the new components
- Monitor the health of the new components
- Bring down the old components

Disadvantages

- Co-existence, sometimes the new component version requires a complete change

Cloud Building Blocks

- Elastic Infrastructure
- Message Queue Services



A photograph of two fishermen on a boat at sunset. The sun is low on the horizon, creating a warm, golden glow over the water. The fishermen are silhouetted against the bright light, and their fishing rods are extended over the water. The boat is on the left side of the frame.

MULTI-TENANCY PATTERNS



Single Instance Component

Problem

- **Optimize the component infrastructure usage**
- Share the same functionality across multiple tenants

Solution

- The tenants can access the shared component via web services
- **Component pooling would boost the performance**

Disadvantages

- Lock and addressing components needs to be dealt carefully

Cloud Building Blocks

- Elastic Infrastructure





Multiple Instance Component

Problem

- **Dedicated Instance of a component for each Tenant**
- Tenant specific customizations needs to be deployed at runtime
- Tenant requirements to not to share due to regulations

Solution

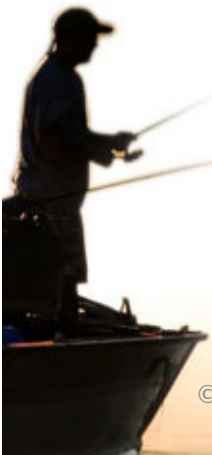
- Automate provisioning/de provisioning of the component
- Keep a data store to manage the existence of the component

Disadvantages

- Difficulty in resource management
- Automation may result in complex programming

Cloud Building Blocks

- Elastic Infrastructure
- Cloud Monitoring
- Auto Scaling



A silhouette of two fishermen on a boat, one holding a fishing rod, against a bright sunset background. The scene is captured in a wide-angle shot, showing the horizon line and the calm water.

BEST PRACTICES & RECOMMENDATIONS



Best Practices

- Design for failure
- Automate your deployments
- Use the Cloud Building Blocks
- Multi Cloud Strategy
- Secure the data while @transit & @rest
- Do not open the infrastructure for entire world
- Use Virtual Private Cloud or VPN
- Verify the SLA's carefully
- Understand the Limitations





Recommendations

- Start experimenting with the cloud
- Unlearn and Learn
- Let the cloud providers know what you want
- Move the non critical business applications first





References

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- <http://aws.amazon.com/solutions/case-studies/css-corp/>
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- <http://www.eaipatterns.org>
- <http://www.soapatterns.org>



Thank You!

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A silhouette of two fishermen on a boat, one holding a fishing rod, against a sunset background. The scene is captured in a wide-angle shot, showing the horizon line and the calm water. The sky is a mix of orange and yellow, with the sun just below the horizon. The boat is on the left side of the frame, and the fishermen are positioned towards the center-left. The overall mood is serene and peaceful.

USE CASES



Use case - I

Premium TechSupport Platform



- TechSupport For Dummies is a premium tech support platform with various value added services bundled as part of the service.
- Highly reliable email, chat & voice support
- To support seasonal spikes
- To provide high end remoting infra for remote support
- Partners to integrate using API
- Multi region CRM access
- Identify the usage pattern, user behavior, root cause analysis for generic problems..etc



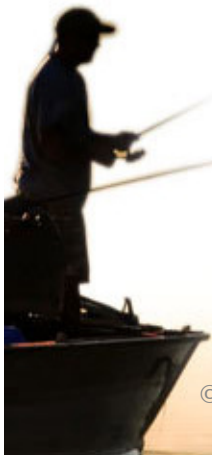


Use case - II

Helping people to connect with great local businesses



- Yelp uses Amazon S3 to store daily logs and photos, generating around 100GB of logs per day. The company also uses Amazon Elastic MapReduce to power approximately 20 separate batch scripts, most of those processing the logs. Features powered by Amazon Elastic MapReduce include:
 - People Who Viewed this Also Viewed
 - Review highlights
 - Auto complete as you type on search
 - Search spelling suggestions
 - Top searches
 - Ads





Use case - III

Communication as a Service

Tropo makes it simple to build phone, SMS and Instant messaging applications. You use the web technologies you already know and Tropo's powerful cloud API to bring real-time communications to your apps.



Twilio provides a web-service API for business to build scalable, reliable communication apps.

