Windows Azure platform
What is in it for you?

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DEVELOPING PEOPLE WHO DEVELOP SOFTWARE

Objectives

- **Motivation**
- **Status quo**
- **Cloud Computing**
- **Windows Azure platform**
  - Windows Azure
  - SQL Azure
  - AppFabric

- **Moving your application to the cloud**

Application architecture today

- **No application is an island**
- **Reality is that a lot of applications get distributed and grow complex over time**
- **Services-based architecture as a target**
  - model the problem domain and draw explicit boundaries
  - service-orientation is a non-technical thing
- **Layering**
  - building interfaces into dedicated application artefacts
- **Separation of concerns**
  - cut application-level 'ilities' from core code
- **Identity management grows rapidly in importance**
- **Green field scenarios more rare than brown field**
  - totally different approaches to judge on and implement requirements

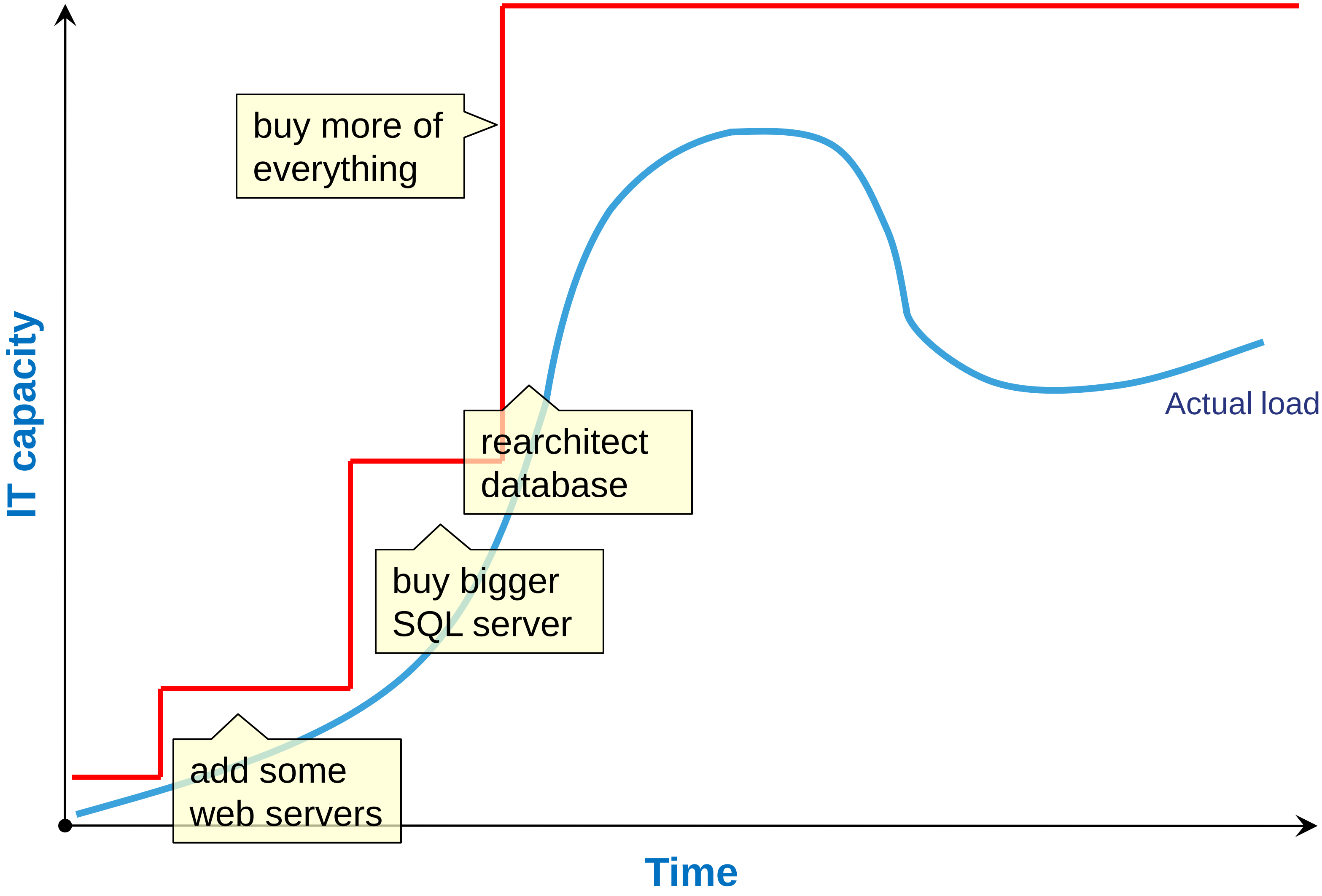
Application deployment & maintenance today

- **Several hosting environments needed for testing, staging, production**
- **Hard to calculate costs for each project/product**
- **Virtualization can ease headaches**
  - consolidation of costs
  - virtual machines not always adequately equipped
- **Tracing and logging are indispensable instruments**
- **Monitoring infrastructure is expensive in operation**
  - not everyone can afford it
- **Patching**
  - bringing out new builds is tedious but critical
- **Availability**
  - ensure to keep application available
  - satisfy ongoing requests

Application scaling today

- **Actually, application 'ilities' today**
- **Tough task to predict need for scalability, availability et. al.**
  - always wanting the maximum of each in unrealistic
- **Many 'ilities' are not an all or nothing**
  - needs are rather on a spectrum
  - being able to scale well for certain amount of time, then scale back
- **Scaling up vs. scaling out**
- **Need for dynamic scaling**
  - elasticity in acquiring and releasing resources

Need for dynamic scale-out



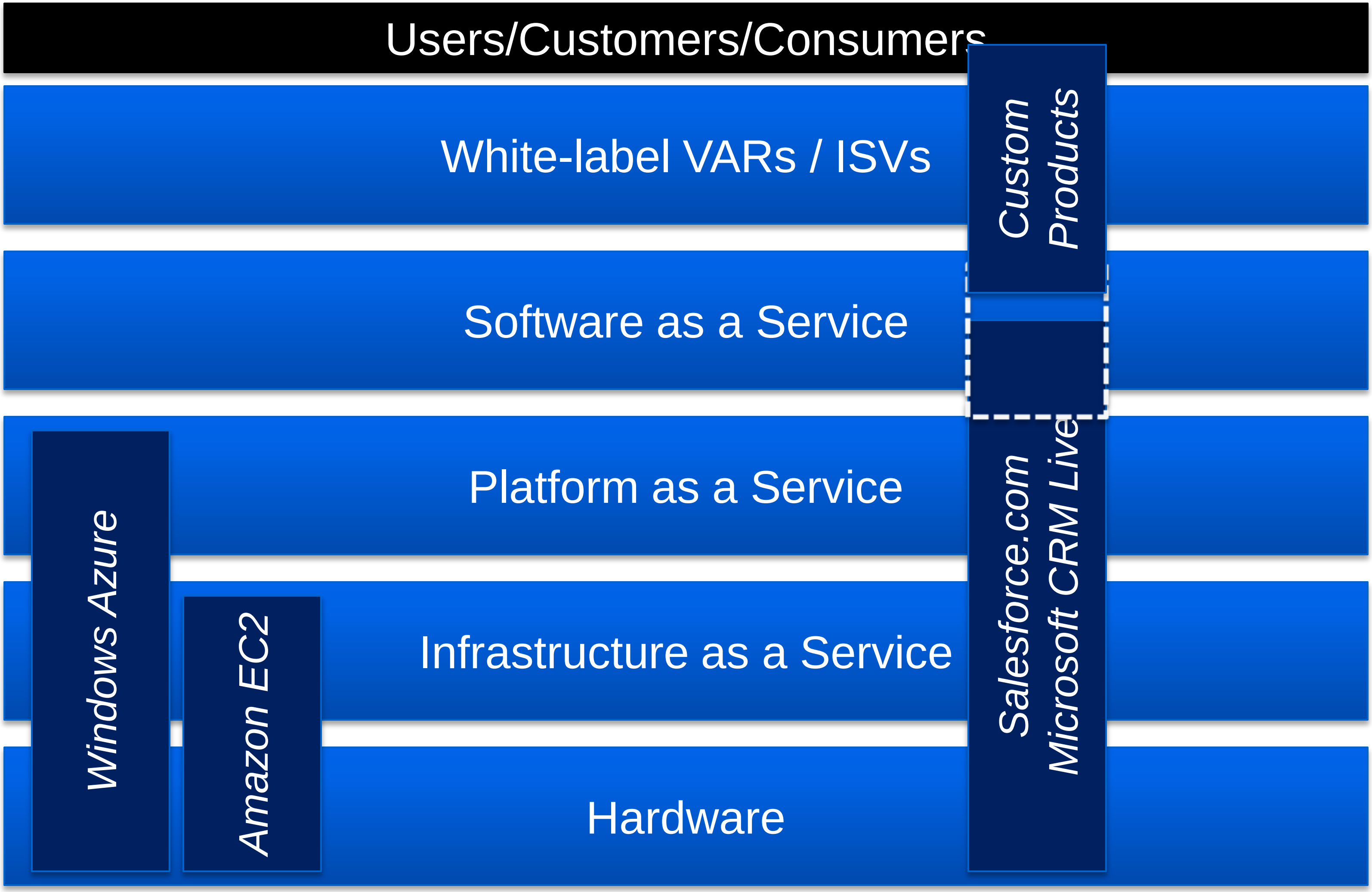
Cloud computing

- **Umbrella term and concept unifying different ideas**
  - "Dynamic IT", “On-Demand", "Utility Computing", "Software-as-a-Service“, “Software + Services”, “Cloud Services”, "Virtualization“
- **Promised advantages**
  - reduce capital & operations costs
  - lower capital lockup and usage-bound billing
  - cost effective handling of peeks
  - simplify application deployment & management
  - always on
  - simplify scaling to possible Internet scale
  - focus on new features & functionality, not infrastructure
- **Vision: "IT like power from the socket“**

Fulfilling the Cloud's promises

- **What we need**
  - cloud operating system
  - infrastructure and platforms as a service
  - utility computing
  - tooling
- **Cloud OS has similar facilities as a desktop OS, but on a set of connected servers**
  - abstract execution environment
  - shared file system
  - resource allocation
  - programming environments
- **Utility computing**
  - 24/7 operation
  - pay for what you use
  - simpler, transparent administration

Cloud stack



Users/Customers/Consumers

White-label VARs / ISVs

Software as a Service

Platform as a Service

Infrastructure as a Service

Hardware

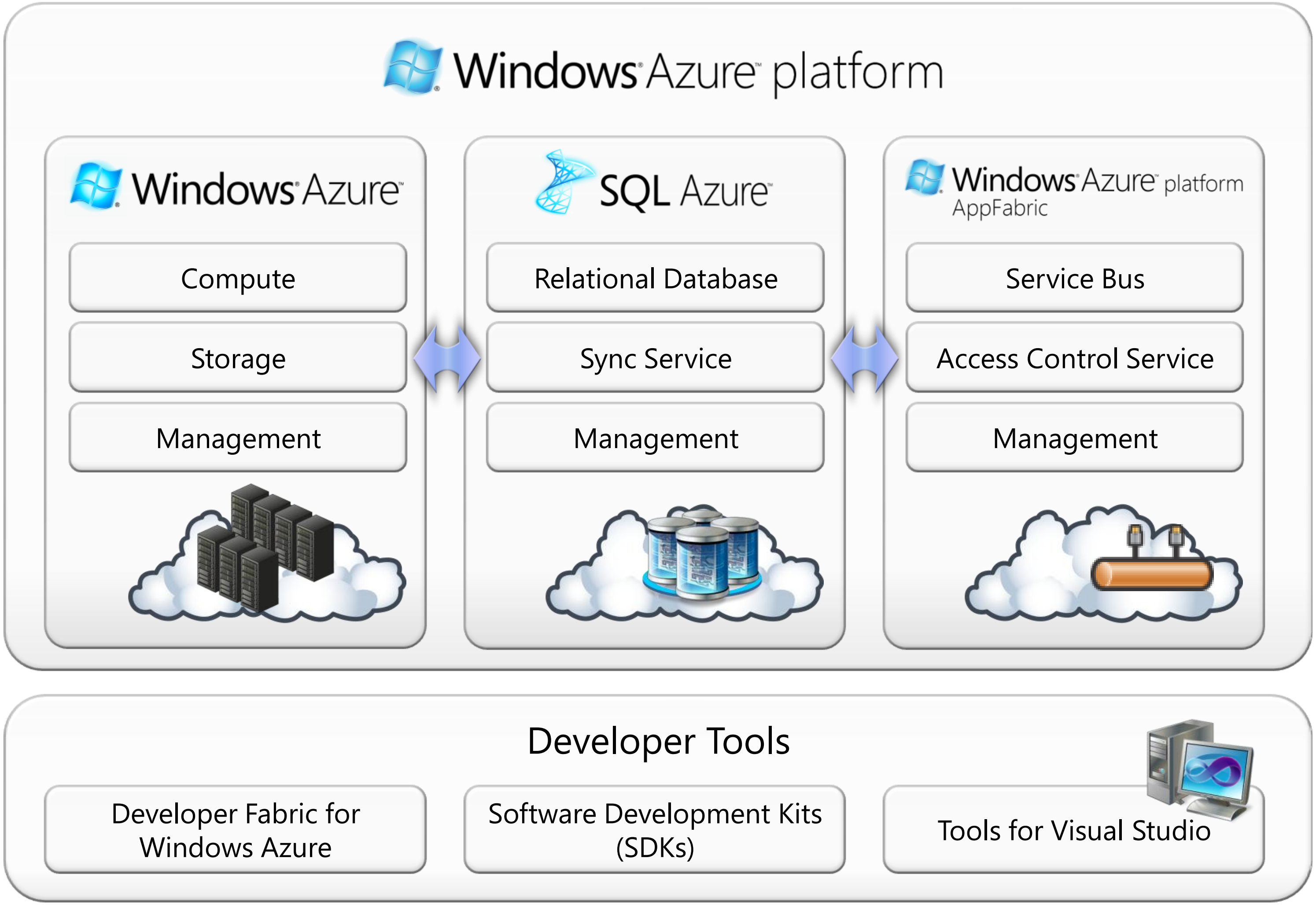
Windows Azure

Amazon EC2

Custom Products

Salesforce.com Microsoft CRM Live

Azure Platform overview



Windows Azure platform

Windows Azure

- Compute
- Storage
- Management

SQL Azure

- Relational Database
- Sync Service
- Management

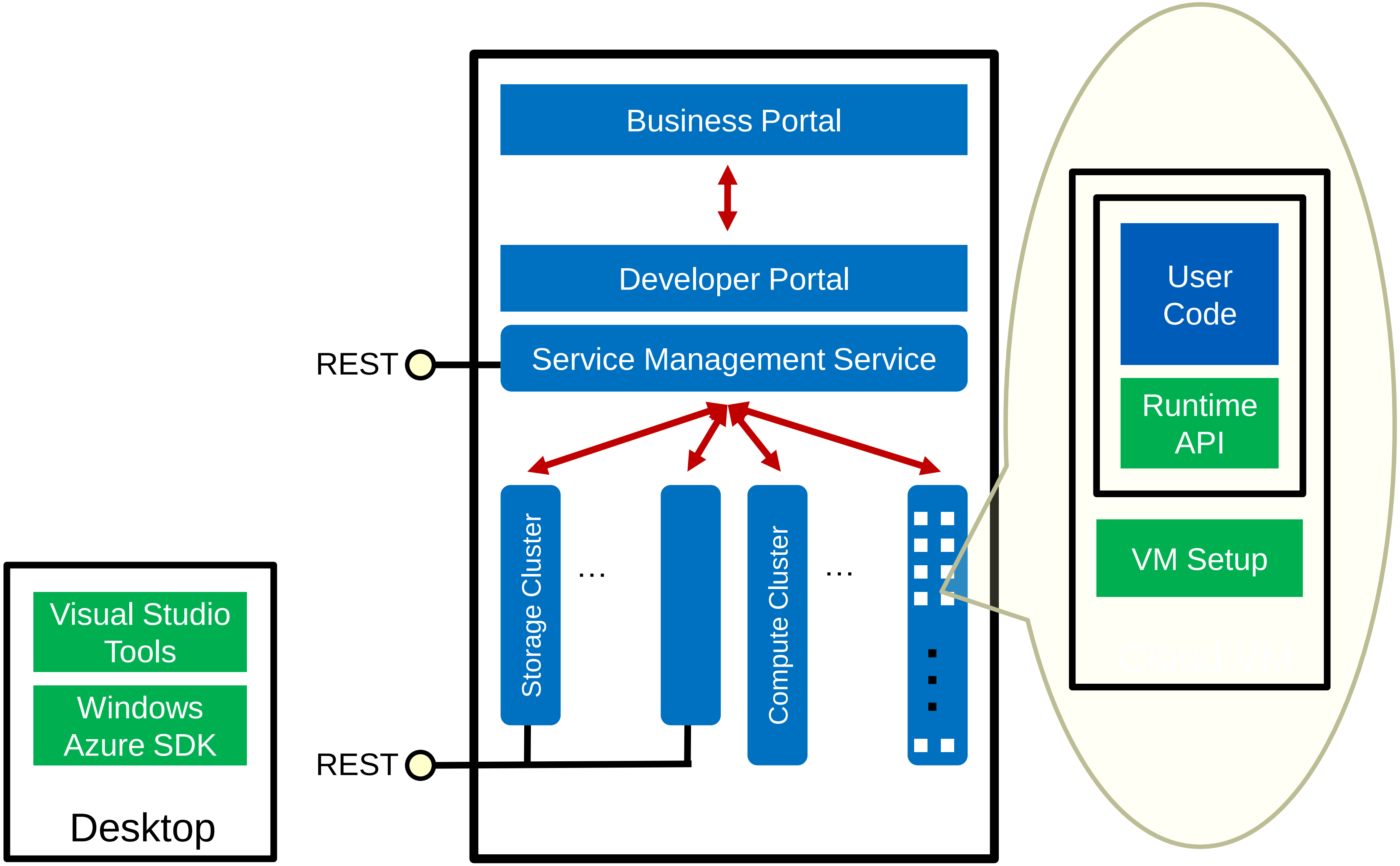
Windows Azure platform AppFabric

- Service Bus
- Access Control Service
- Management

Developer Tools

- Developer Fabric for Windows Azure
- Software Development Kits (SDKs)
- Tools for Visual Studio

Windows Azure technical view

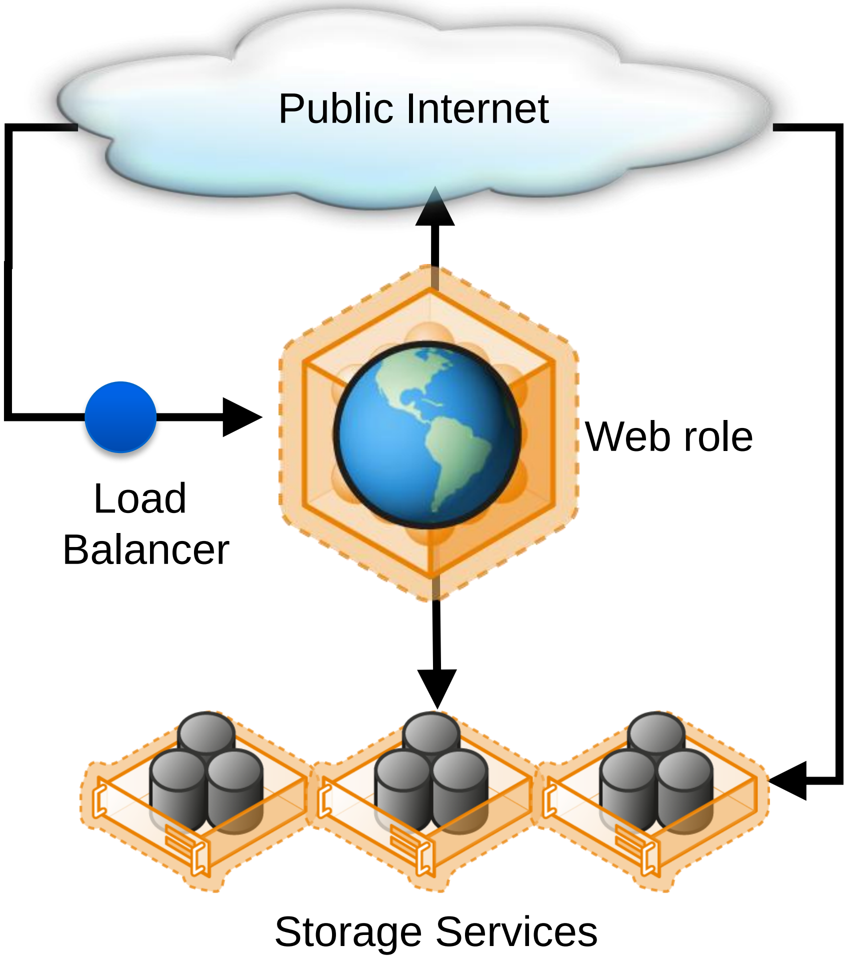


Windows Azure compute

- **App-centric development and execution model**
- **Applications can be**
  - fault-tolerant
  - highly available
  - highly scalable
- **Application (aka service) requirements modelled through DSL**
  - roles
  - instances
  - interfaces
- **Provides elasticity in compute**
- **Monitoring and management built-in**
- **Different VM sizes available**

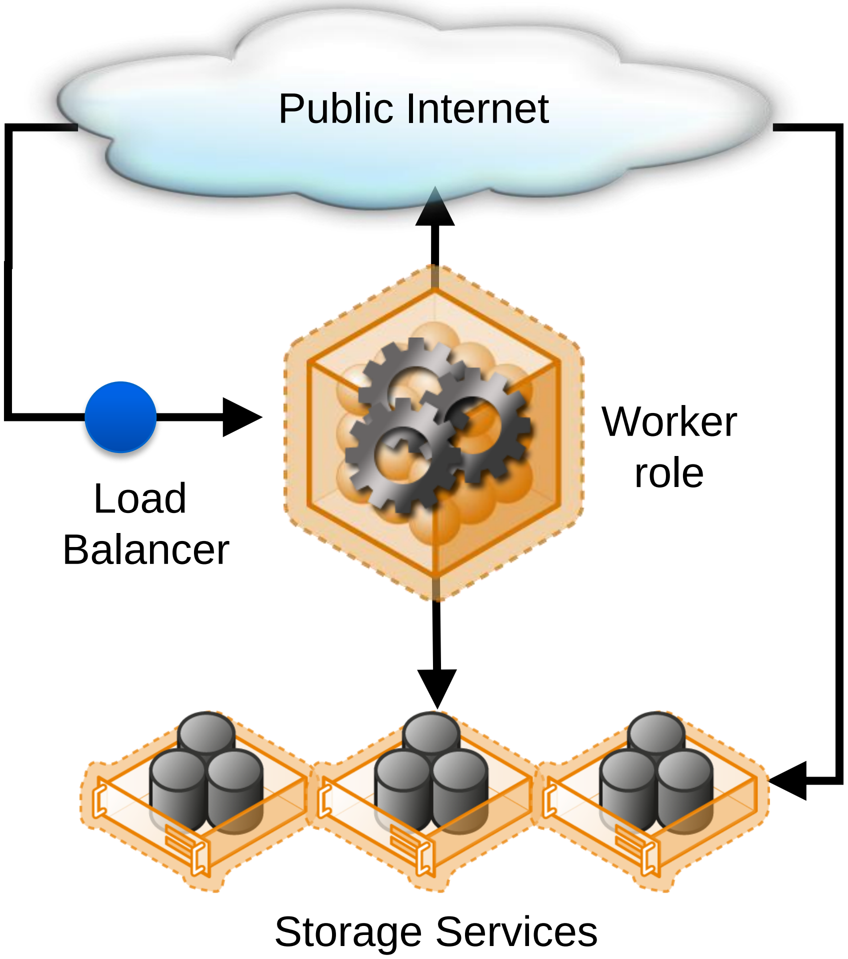
Web role

- **Implement web applications and web services with web role**
  - based on .NET 3.5 SP1
  - can run managed full trust and native code
- **Web farm that handles HTTP/S requests from the Internet**
- **IIS7 hosted web core**
  - hosts ASP.NET
  - integrated managed pipeline
  - supports SSL



Worker roles

- **Worker role provides means to run code beyond a per-request base**
  - always-running code
  - background processing
- **Executes .NET 3.5 SP1 full trust and native code**
  - can spawn processes
- **Can accept network connections from Internet**
  - HTTP/HTTPS
  - TCP



Windows Azure storage

- **Table, blob and queue storage capabilities**
- **Data can be**
  - fault-tolerant
  - highly available
  - highly scalable
- **Goal is having data close to applications**
- **Independently accessible**
  - can be used from any platform, on-premise or cloud-based
- **Independently scalable**
  - does not depend on Windows Azure compute
- **Partitions are key concept for scalability**

SQL Azure

- **Database as a service**
- **Relational database management system in the Cloud**
- **Compatible with known SQL Server tooling**
- **Not a full-blown SQL Server instance**
  - only the core database engine
- **No full support for all database features and T-SQL**

Windows Azure platform AppFabric

- **Access Control**
  - service for issuing access tokens based on authorization rules
  - resource STS in the cloud
  - can be federated with different identity providers, e.g. Active Directory, Windows Live
  - REST-based programming interface
  - intensively used by the Service Bus
- **Service Bus**
  - application messaging bus infrastructure
  - enables application integration beyond physical boundaries
  - implements open format and protocols
  - supports REST and WS-*
  - uses Access Control to allow sending messages to and listening on endpoints

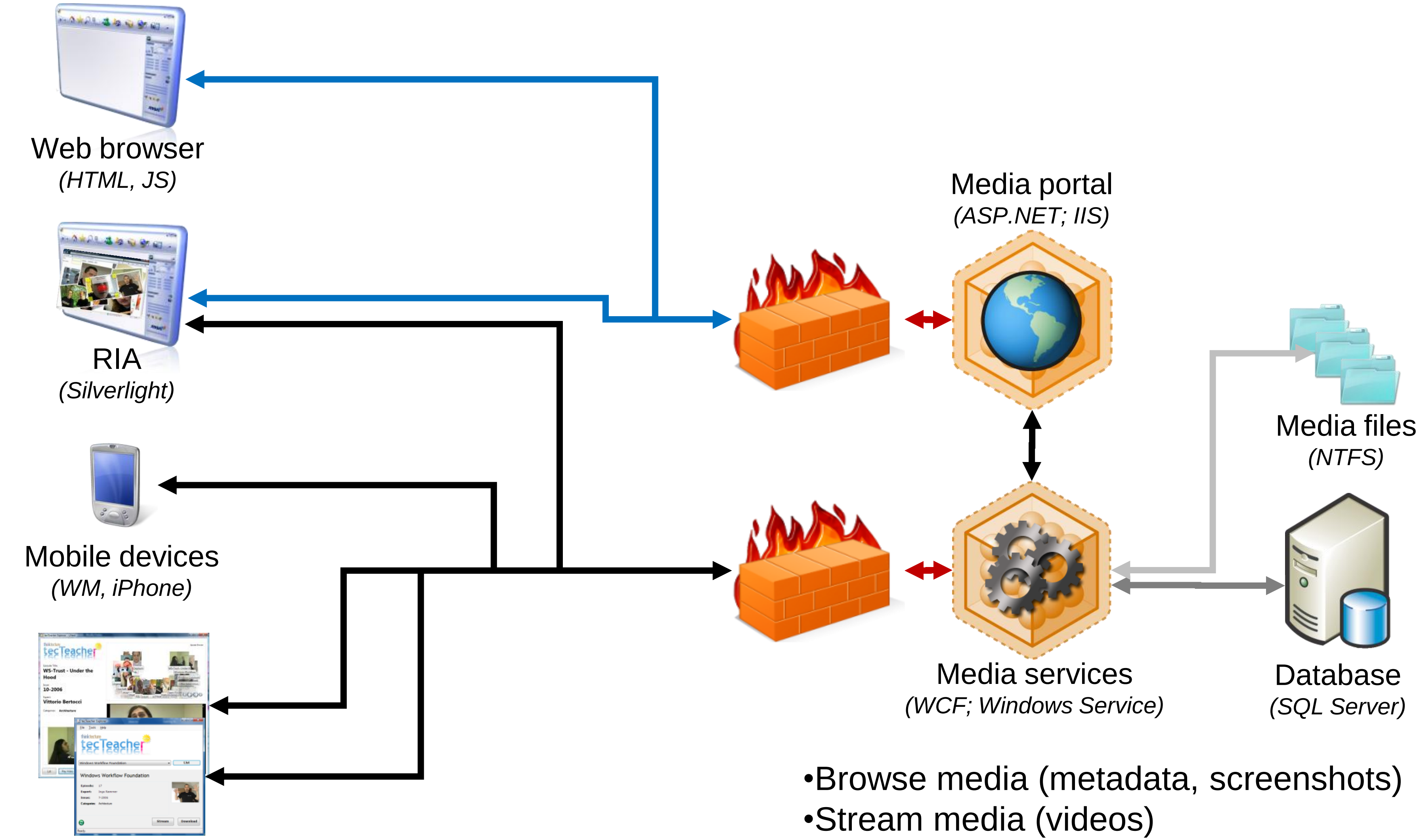
Moving your applications into the Cloud

- **Ubiquitous connectivity**
  - Windows Azure platform Service Bus
- **Endless compute power**
  - Windows Azure Compute
- **Asynchronous data and command dispatching**
  - Windows Azure Queue Storage
- **Relational data storage**
  - SQL Azure
- **Large scale data partitioning and storage**
  - Windows Azure Blob & Table Storage
- **Federated authentication and authorization**
  - Windows Azure platform Access Control

A realistic sample application

- **A service-oriented sample application architecture**
  - realistic but not real
  - exposing typical structured data
  - dealing with large data
- **Handling broad range of client/consumer applications**
  - ASP.NET, WCF
  - Silverlight
  - Windows Forms, WPF
  - Windows Mobile, iPhone
  - Java
- **Dealing with a number of non-functional requirements**
  - scalability
  - reliability
  - extensibility
  - securability

Sample architecture: Media – bird's view



Web browser
(HTML, JS)

RIA
(Silverlight)

Mobile devices
(WM, iPhone)

Smart clients
(Windows Forms, WPF, Java)

Media portal
(ASP.NET; IIS)

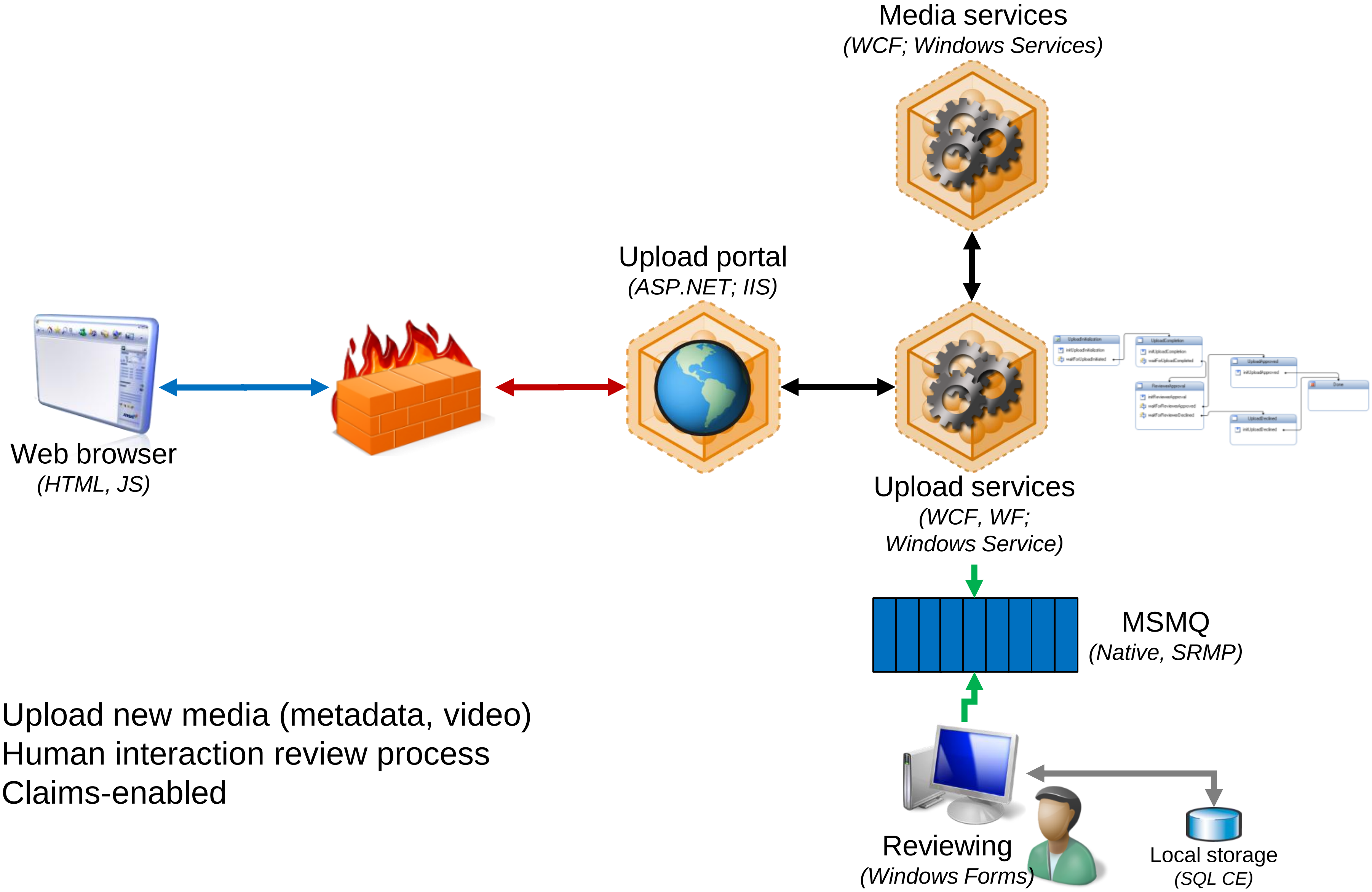
Media services
(WCF; Windows Service)

Media files
(NTFS)

Database
(SQL Server)

- Browse media (metadata, screenshots)
- Stream media (videos)
- Notifications
- Claims-enabled

Sample architecture: Upload – bird's view

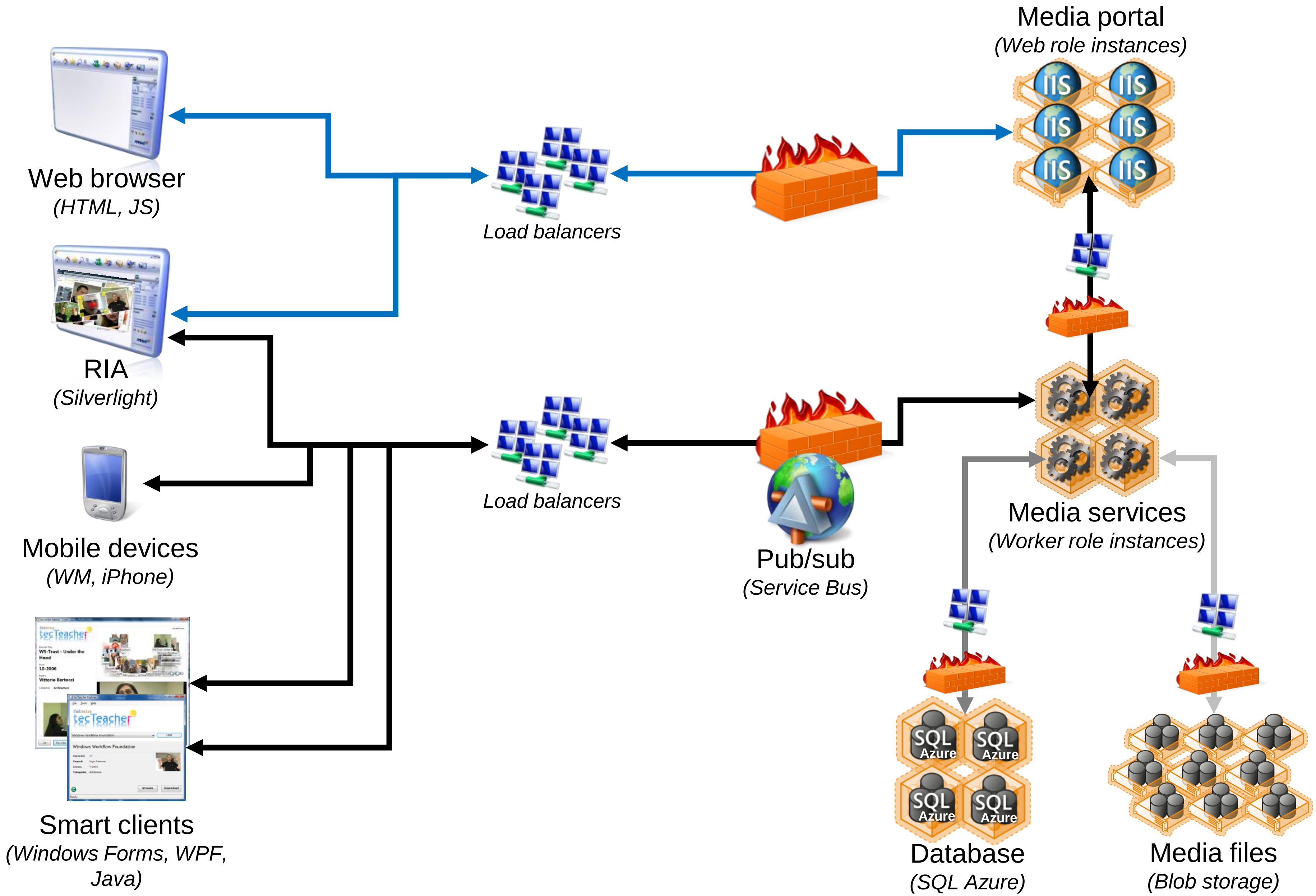


- Upload new media (metadata, video)
- Human interaction review process
- Claims-enabled

Benefits from the Cloud for the application sample

- **Extend reach of WCF Media services**
  - expose necessary endpoints via the Service Bus
  - enable powerful communication patterns
  - services still hosted on-premise
- **Scale on-demand**
  - Media WCF services in Azure Compute worker role
  - ASP.NET Media portal in Azure Compute web role
- **Easily accessible relational data**
  - migrate local SQL Server databases to SQL Azure
- **Scaling out data**
  - partition media and upload data and move it into Azure Table storage
- **Massive data store**
  - store videos, thumbnails in Azure Blob Storage
- **Federating access to public endpoints**
  - using Access Control with STS to control access to SB services

Sample architecture: Cloud Media – example



Summary

- **The "Cloud" allows for interesting scenarios**
  - scaling, management, security
  - know your costs
- **Windows Azure Platform is Microsoft's cloud offering**
  - platform as a service
  - compute, storage, RDBMS, authorization, communication
  - local simulation environment for most cases
- **Applications need to be designed for the cloud**
  - no simple "repackage & deploy"
  - load balanced by design
  - patterns for cloud applications