


Universidad de los Andes

Deploying Scalable Web Applications in the Cloud using the Microservice Architecture Pattern











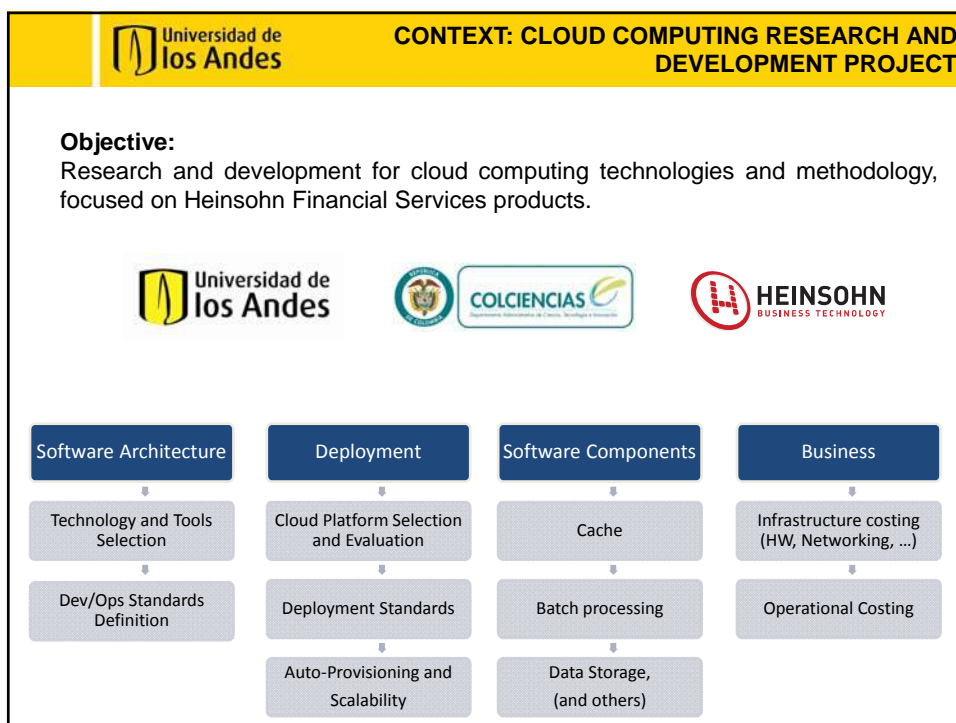
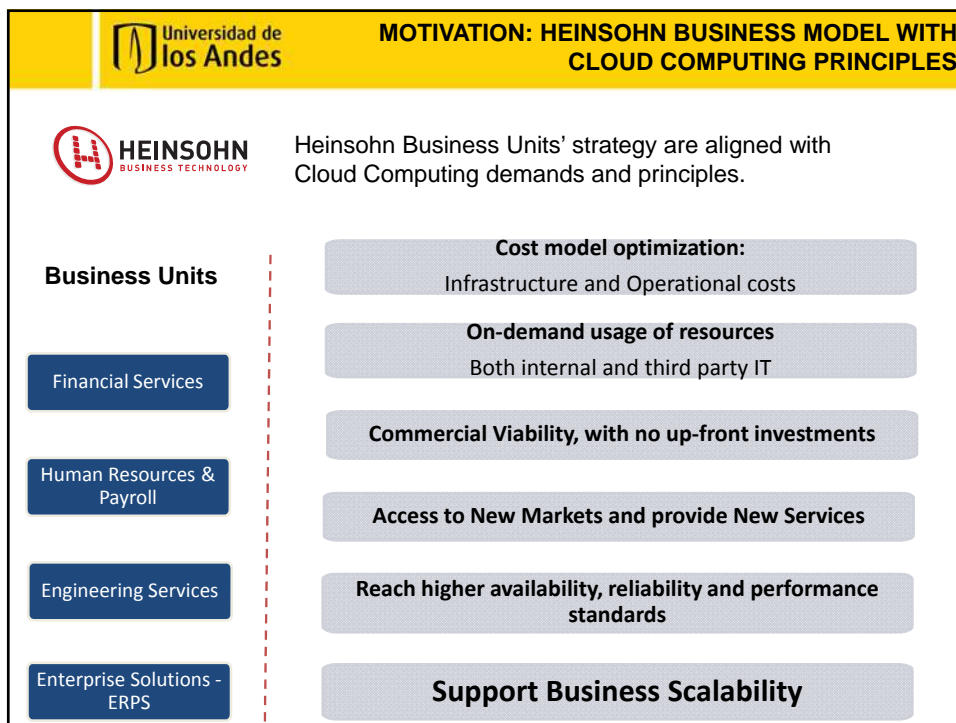
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 Heinsohn Mapeo, Universidad de los Andes
 Bogotá, Colombia


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MOTIVATION: HEINSOHN BUSINESS MODEL WITH CLOUD COMPUTING PRINCIPLES



Heinsohn Business Units' strategy are aligned with Cloud Computing demands and principles.

Business Units	Products (on premise)	SaaS Products	BPO Process Outsourcing
Financial Services	Pensiones Credito y Libranza Portafolios de Inversión ...		Outsourcing – Heinsohn MAPEO
Human Resources & Payroll	Heinsohn Nomina Gestion Humana		Outsourcing – Heinsohn HGS
Engineering Services	Servicios de TI Orientados a cloud / On.-Premise		Operación Tecnológica
Enterprise Solutions - ERPS	SAP Business One On-Premise / Cloud ...		



BUSINESS APPLICATION

Simulador dependiendo de lo que puedo pagar al mes

Si quiere saber con un determinado monto, cuánto puede pagar al mes ya sea para vivienda, locales y otros, con un crédito en UVR o pesos dé clic aquí.

Ver simulador

Simulador dependiendo del valor del inmueble que quiero

Si quiere saber con un determinado monto, cuánto puede pagar dependiendo del valor del inmueble que quiere, ya sea para vivienda, locales y otros, con un crédito en UVR o pesos dé clic aquí.

Ver simulador

Simulador dependiendo del monto que quiero prestar

Si quiere averiguar con un determinado monto de dinero a prestar, cuánto puede pagar al mes ya sea para vivienda, locales y otros, con un crédito en UVR o pesos dé clic aquí.

Ver simulador

Simulador dependiendo del beneficio del Gobierno

Aquí podrás encontrar como quedará tu cuota después de aplicar el subsidio para vivienda nueva otorgado por el Gobierno nacional.

Ver simulador

Tasa CPT Sin Beneficio: 12,25%

Valor Cuota: 714.568

The application is designed to support the business process of generating and querying the payment plans for loans of money delivered by an institution to its customers.

PROYECCIÓN CON TASA SUBSIDIADA			PROYECCIÓN CON TASA POLÍTICA		
Cuotas	Valor Cuota	Saldo Restante	Cuotas	Valor Cuota	Saldo Restante
1	615.100	69.772.119	1	714.568	69.816.840
2	615.100	69.542.978	2	714.568	69.632.289
3	615.100	69.312.569	3	714.568	69.446.337
4	615.100	69.080.886	4	714.568	69.258.973
5	615.100	68.847.921	5	714.568	69.070.187
6	615.100	68.613.667	6	714.568	68.879.968
7	615.100	68.378.117	7	714.568	68.688.305
8	615.100	68.141.265	8	714.568	68.495.187
9	615.100	67.903.102	9	714.568	68.300.602

CASE STUDY

Business case study:

- A Software as a Service (SaaS) application.
- Several tenants using the application.
- Hundreds of employees per tenant accessing the application to generate payment plans.
- A payment plan can take 5 seconds to be generated.

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PROTOTYPE AND BUSINESS REQUIREMENTS

Simulador Plan de Pagos
+ Crear
Generar Plan de Pagos
Cancelar
Buscar por Cédula
Buscar por ID
Planes de Pagos

Tipo Documento

Número Documento

Línea de Crédito

Monto

Perfil de Riesgo

Plazo (Meses)

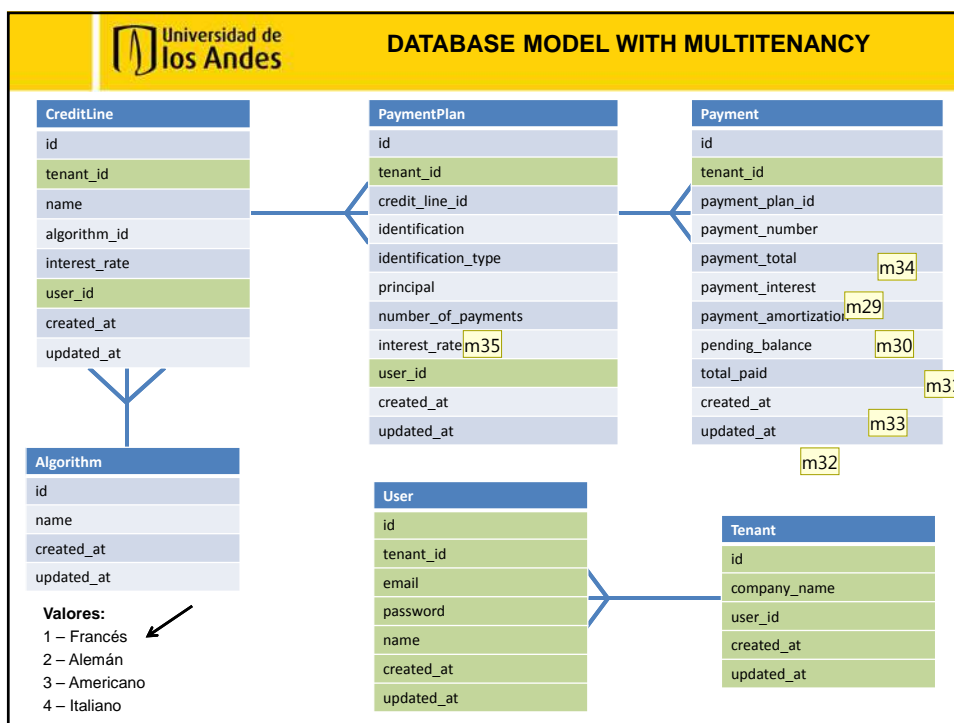
Días de Gracia

Fecha de Cuota #1

Tasa (%)


Valor A Girar

Service	Requests per Minute	Average Response Time (ms)	Maximum Response Time (ms)
S ₁ – Generate a payment plan	30	3,000	6,000
S ₂ – Get a payment plan	1,100	300	1,500



Diapositiva 8

- m31** Este es el valor a pagar por capital.
mj.villamizar24, 04/06/2014
- m30** Este es el valor a pagar por intereses.
mj.villamizar24, 04/06/2014
- m29** Este es el valor total a pagar.
mj.villamizar24, 04/06/2014
- m33** Este es el valor pendiente de pago DESPUÉS de realizar este pago.
mj.villamizar24, 04/06/2014
- m32** Este es el valor total pagado del préstamo DESPUÉS de realizar este pago.
mj.villamizar24, 04/06/2014
- m34** Este es el número de pago. Empieza en 0 y termina en el número de pagos del plan de pagos.
mj.villamizar24, 04/06/2014
- m35** Este es el valor prestado.
mj.villamizar24, 04/06/2014


RELATED WORK – MICROSERVICES

Adopting Microservices at Netflix: Lessons for Architectural Design
NETFLIX


February 19, 2015
TONY MAURO

Scaling Microservices at Gilt with Scala, Docker and AWS
GILT

by Daniel Bryant on Apr 26, 2015 | 1 Discuss

From a Monolith to Microservices + REST: the Evolution of LinkedIn's Service Architecture
LinkedIn

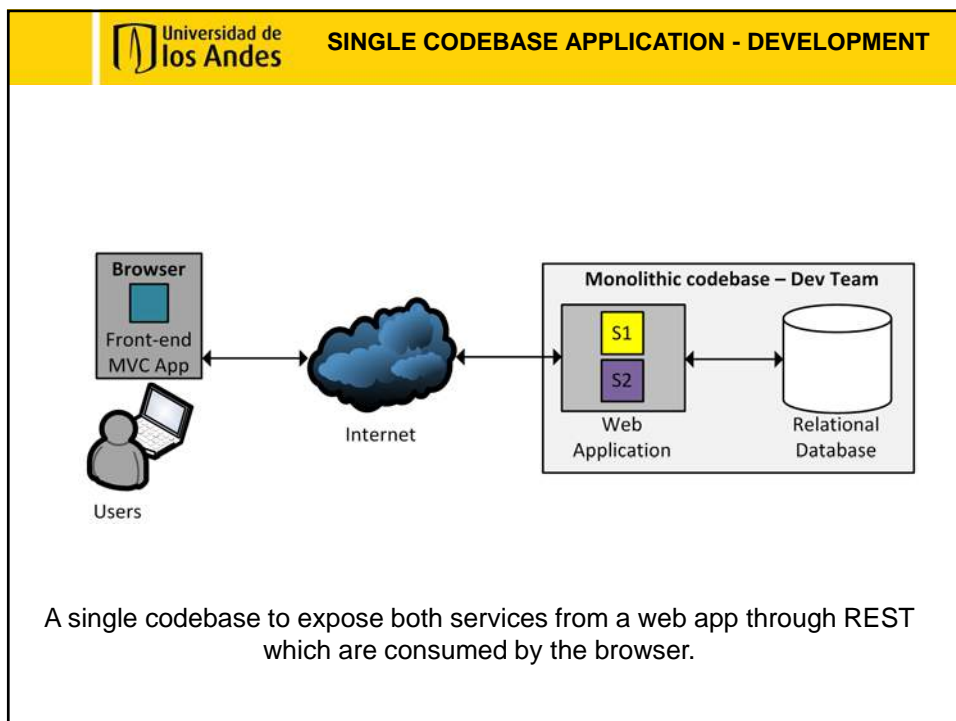
by Steven Ihde, Karan Parikh on Mar 29, 2015 | Discuss

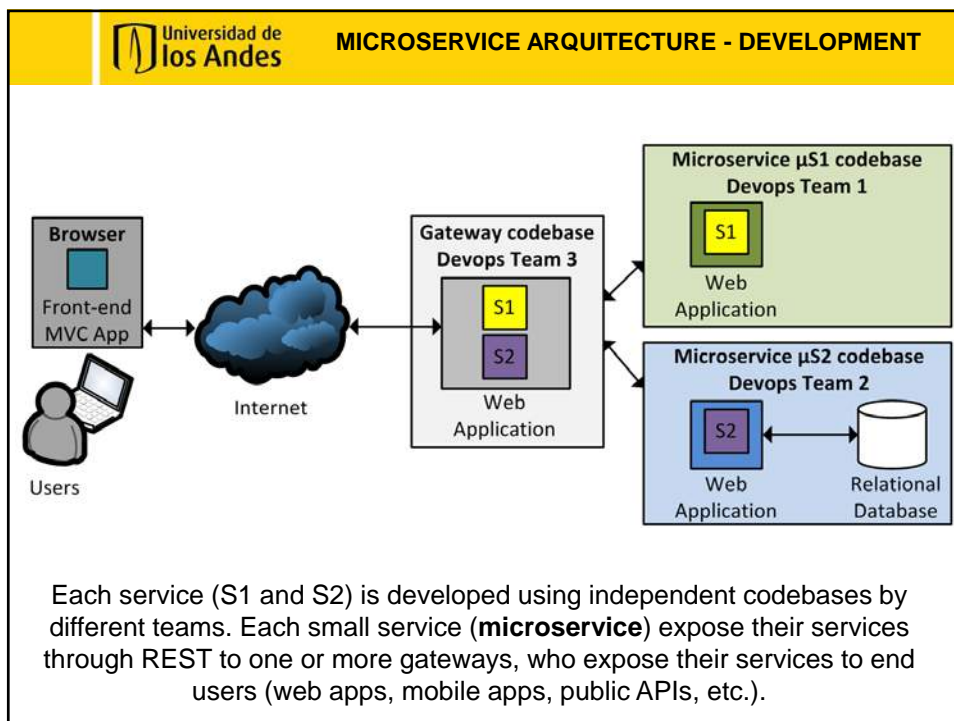
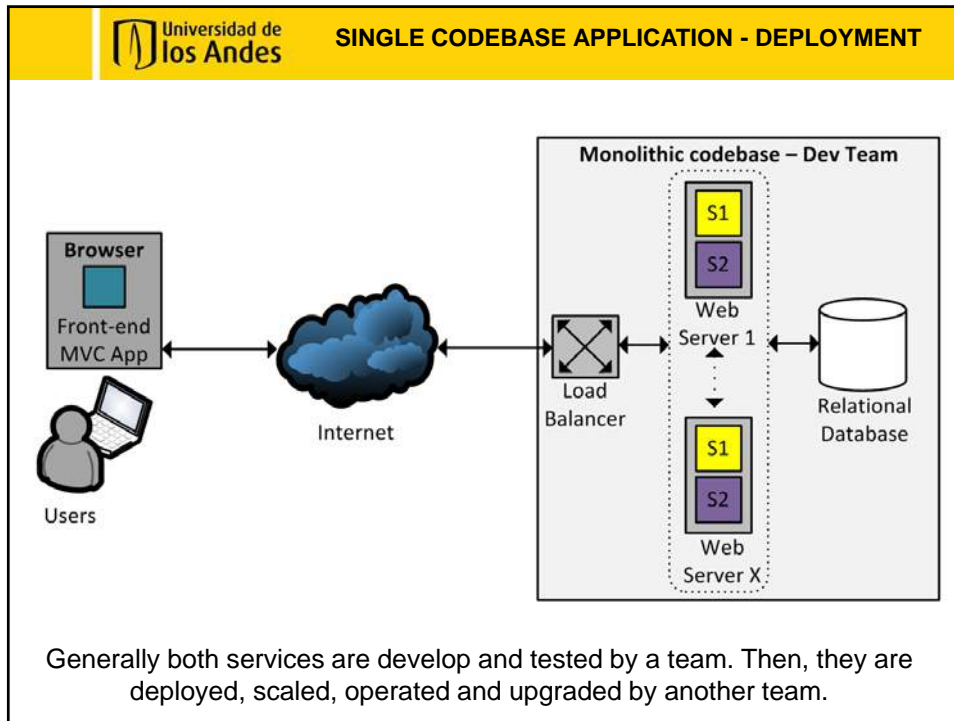
Building Products at SoundCloud–Part III: Microservices in Scala and Finagle


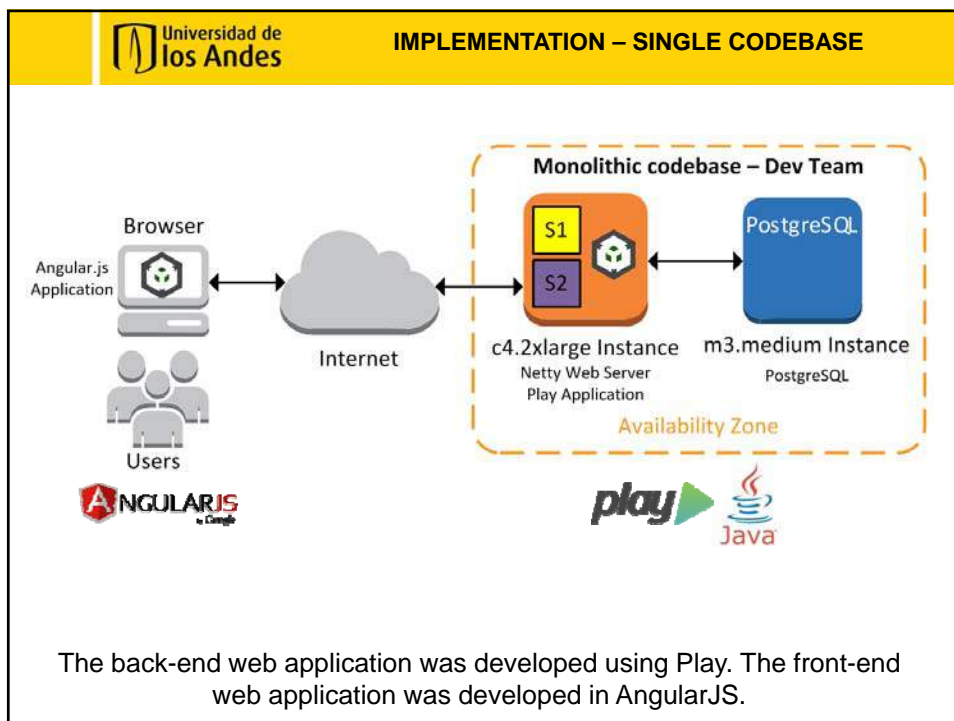
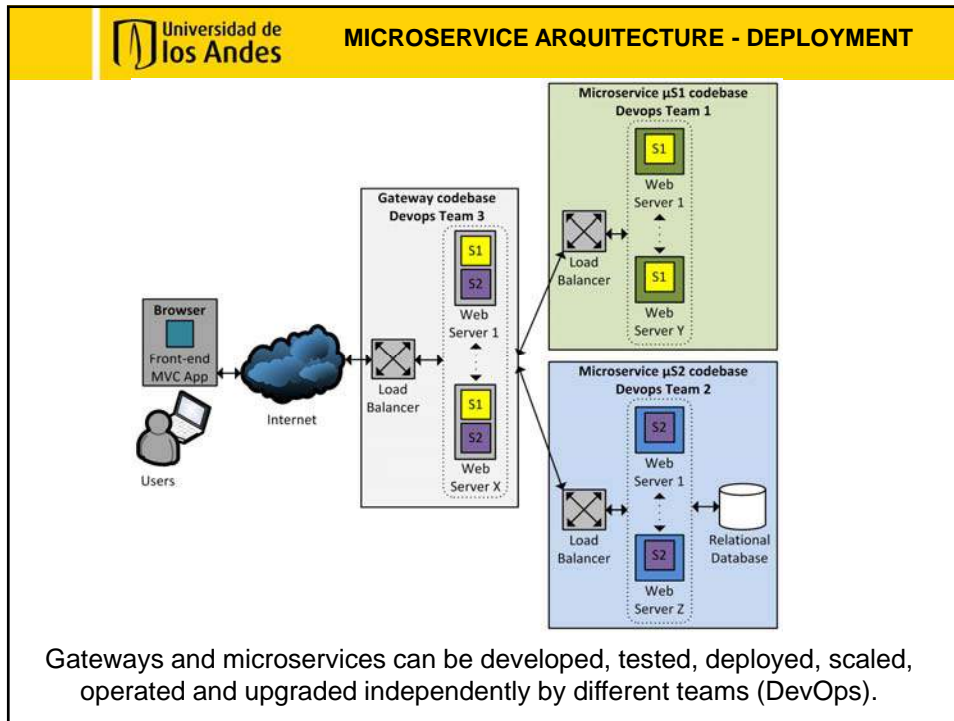
By Phil Calgado

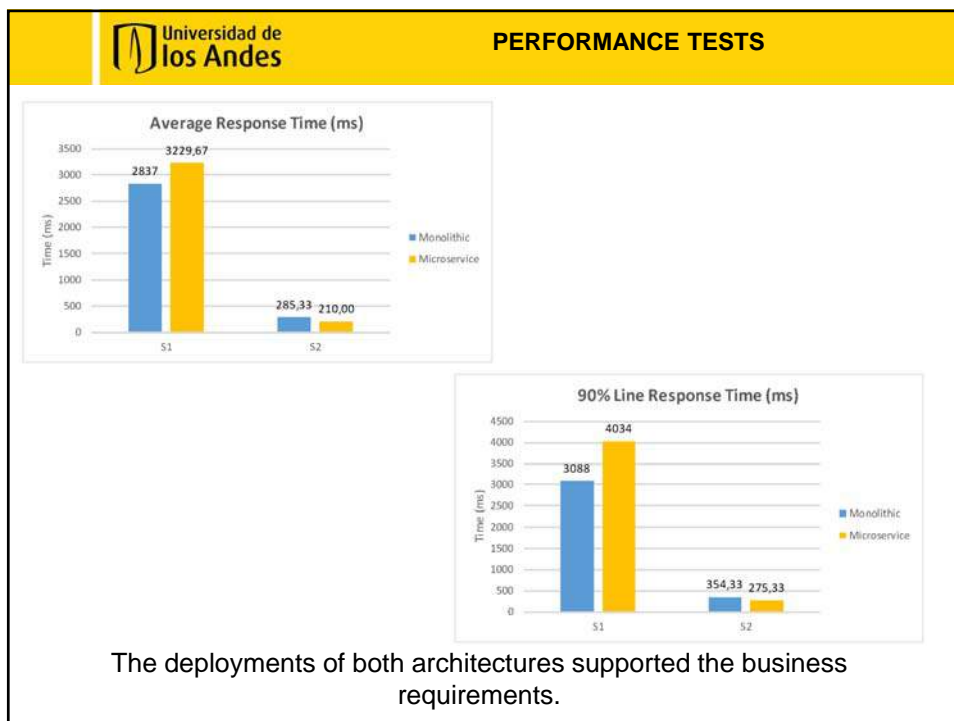
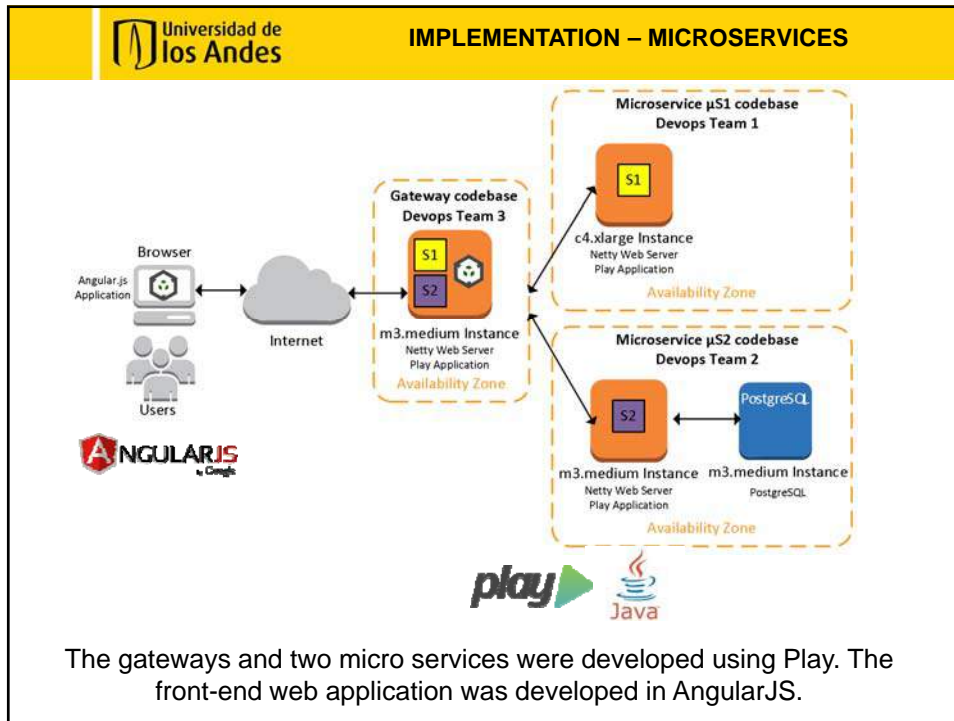
Microservices and SOA


by Mark Little on Mar 23, 2014 | 10 Discuss










IMPLEMENTATION – MICROSERVICES


Single Codebase

Service	Cost per Hour (USD)	Quantity per Month	Cost per Month (USD)
Web application. 1 EC2 instance c4.2xlarge.	\$0.464	720	\$334.08
Web application. 1 RDS instance db.m3.medium with Single-AZ.	\$0.090	720	\$64.80
Total cost per month			\$398.88


Microservice Architecture


Service	Cost per Hour (USD)	Quantity per Month	Cost per Month (USD)
Microservice μ_{S_1} . 1 EC2 instance c4.xlarge.	\$0.232	720	\$167.04
Microservice μ_{S_1} . 1 RDS instance db.m3.medium with Single-AZ.	\$0.090	720	\$64.80
Microservice μ_{S_2} . 1 RDS instance m3.medium.	\$0.067	720	\$48.24
Gateway. 1 Instance m3.medium.	\$0.067	720	\$48.24
Total cost per month			\$328.32

In the case study with the microservice architecture the company may **reduce infrastructure costs by 17%**.



MICROSERVICES – PROS AND CON

Benefit	Cost
Small units of reuse	Complexity of distributed systems
Lower complexity per developer	Learning curve
Grow development independently	Network overhead
Scale independently	Distributed data/transactions
Independent DB	Business culture adoption
Heterogeneous technologies	Service management/versioning
Better availability/failure tolerance	Automation and monitoring
Continuous delivery strategies	Distributed testing


FUTURE WORK




- Larger performance tests with auto scaling mechanisms.
- Wider analysis of costs related to develop applications using microservices.
- Tests with tools to automate the deployment of microservices/gateways (Docker, Amazon EC2 Container Service, and AWS Lambda).
- Tests to evaluate other concerns such as failures tolerance, distributed transactions, heterogeneous data, service versioning and microservice granularity.
- Analysis of how to apply/adopt solutions already implemented in SOA/ESB to microservice environments.



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