Desmistificando Microsserviços e DevOps: Projetando Arquiteturas Efetivamente Escaláveis

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[IF1004] - Seminários em SI 3
https://github.com/vinicius3w/if1004-DevOps

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AssertLab
Advanced Software and Systems Engineering Research Technologies

Centro de Informática

40 anos

Crosscuting Concerns

Business Considerations

"If you want to make God really laugh, show him your Business Plan.
—Barry Gibbons"

Introduction

- If you are in a startup, your management structure is going to be sparse, with low levels of bureaucracy.
- As your organization grows, the structure changes in all but the rarest of cases.
- Introducing a substantial new technology in an established enterprise is typically both a bottom-up and a top-down process
  - The proponents for DevOps are asking for major changes in organizational structure and in how the organization interacts with external stakeholders

Business Case

Sections of the Business Case for the Introduction of DevOps

Section Title	Content
Problem	Why is introducing DevOps practices going to be good for the organization?
Costs	What are the expected costs of the introduction?
Stakeholder impact	What is the impact on stakeholders, both internal and external?
Risks and mitigation	What are the organizational and technical risks associated with introducing DevOps practices? How are these risks to be mitigated?
Rollout plan	What is the plan for rolling out the DevOps practices?
Success criteria	How will we know if the introduction of DevOps practices is successful?

The Problem and Benefits from Solving the Problem

- The overall case for using agile is to reduce the time between a business concept and its deployment to users

- DevOps is about reducing the time between committing a change to a system and the change being placed into normal production, while ensuring high quality

Setting targets

- First, there are a limited number of quantitative reports on the effectiveness of DevOps practices
- Second, there are five different categories of DevOps practices and each practice has some impact on achieving the target values (lecture #2)
- Finally, every organization is different!

Achieving goals

- Organizational change requires champions ~> at both the technical level and the managerial level (Garcia, 2010)
- Should include representatives of both primary affected groups — Dev and Ops
- Responsible for preparing the business case

Costs

- The costs associated with DevOps are partially continuing and partially one-time costs
  - The continuing costs are associated with tools and people
  - A one-time cost is the expense of the introduction of DevOps practices and the modification of existing systems to support DevOps practices

Stakeholder Impact

- Internal Stakeholders ~> Dev and Ops
  - Dev group gains additional responsibilities and control
  - Ops group loses responsibilities and control, and
  - DevOps role will be new

- We discussed additional and shifting responsibilities in terms of the five categories of DevOps processes we identified in lecture #2

Stakeholder Impact

- External Stakeholders
  - What's the main goal of the DevOps practices?
  - Business and management stakeholders need to understand that they are making a tradeoff when adopting DevOps deployment practices
  - They are giving up the visibility afforded by a formal release process in order to achieve faster cycle times.

Risks and Their Mitigation

- The risks associated with the introduction of DevOps practices are both organizational and technical.

Organizational Risks

- Breaking down barriers between Dev and Ops
  - Barriers exist because these two organizational units have different missions, different cultures, and different incentives
- The creation of a new role of DevOps engineer also causes stress within an organization
- Placing scripts and configurations under version management and controlling how new versions of systems are deployed
- One suggested solution to mitigate these risks is to adjust the key performance indicators (KPIs) of each group to reflect overall rather than individual success in deployment

Technical Risk

- What changes are required to existing production architectures of applications?

- How is the integrity of the production database going to be maintained?

Changes Required to Existing Production Applications

- State management
  - Components should be stateless if at all possible
  - Stateless components are more resilient to failure because replacing a failed component is not difficult
- Feature toggles
  - If a rolling upgrade deployment model is being used, then feature toggles should be used to control new features
  - A feature toggle manager should be introduced to control the feature toggles.

Maintaining the Integrity of the Production Database

- The integrity of the production database can be compromised in one of two fashions:
  - Data from a test can be mistakenly included in the production database
  - A deployment into production compromises the database
    - rollback/roll forward plans to correct erroneous data

Rollout Plan

- You could implement a “big bang” delivery where everything is done at once, or an incremental delivery where practices are introduced
  - DevOps maturity model
- In lecture #2, we identified five different aspects of DevOps. They can be used as a guide to rolling out a set of DevOps practices.

Success Criteria

- The success criteria are based on both the rollout plan and the rationale for adopting DevOps
- The rollout plan provides metrics for the categories in each of the periods identified.
- Focus your efforts on metrics that you can collect, both before the introduction of DevOps and after.

Measurements and Compliance to DevOps Practices

Measurements and Compliance to DevOps Practices

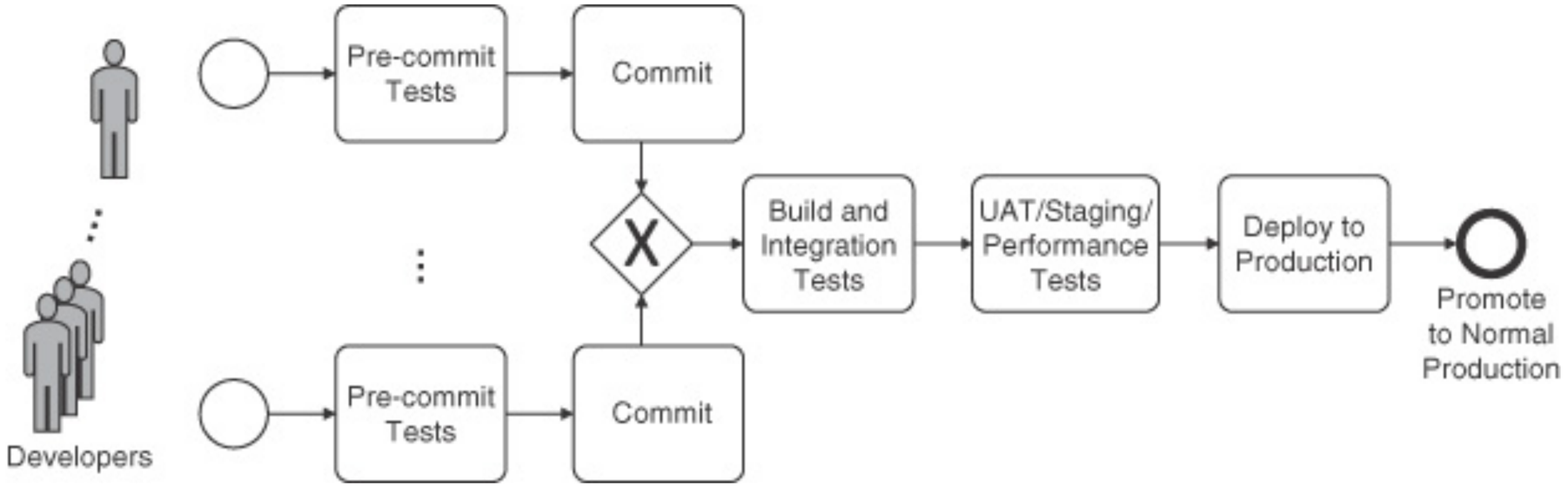
- Measurement should be designed with specific goals

- What kinds of measurements that are of interest to the business with respect to DevOps and its adoption?
  - How well the DevOps practices are succeeding?
  - What are the cases of noncompliance to DevOps practices?
  - What is the level of stakeholder satisfaction with the DevOps practices?

Measuring the Success of DevOps Practices

- The goals of the DevOps practices and the stages of the pipeline dictate the types of measurements that should be taken
  - the times from commit to production and from error to fix

Reducing the time between commit and deployment



- The time between a commit and its successful deployment is the sum of the time waiting in the queue at each stage of the deployment pipeline and the time spent processing at each server in the pipeline
- At the continuous integration server, measurements should be taken of the number of branches active over time, the time between the creation of a branch and its merge into the trunk, and the time it takes to run tests

Reducing the time between the discovery of an error and its repair

- Errors in this context mean errors in the production version of a service
  - Does the automation of the various stages of the pipeline increase or decrease the number and severity of errors that escape into production?
  - Secondly, has the time between discovery and repair of a problem changed as a result of introducing DevOps practices?

Measuring Compliance to DevOps Practices

- We identify two practices where compliance might be an issue
  - Launching VMs: An example of noncompliance with the practices is when an operator launches a VM from the console during some incident
  - Removing feature toggle code: At this point, an entry can be created in the issue tracking database that identifies the removal of the feature toggle code as an activity to be performed

Measuring Stakeholder Satisfaction

- Short questionnaires: Internal stakeholders can be asked to rate their satisfaction on a scale of, say, 1 to 5
- Crises: One of the goals of any process improvement effort is to remove the necessity for heroic efforts
- Outages: When an outage occurs, there is usually no time for performing a deep analysis of the cause
- Inadequate lead time for events: Events such as a security audit, a rollout of a change to an existing system, or an installation of a patch have the potential to be disruptive

Points of Interaction Between Dev and Ops

Points of Interaction Between Dev and Ops

- Several points of interaction occur between Dev and Ops that we have not yet discussed in detail
- The two points this section is concerned with are licensing and incident handling

Licenses

- A software license is a legal agreement governing the use or redistribution of software
- We identify three situations where both Dev and Ops are involved in issues associated with licenses
  - Expiration ~> Typically, the responsibility for renewing licenses lies with Ops
  - License unavailable ~> Some licenses are “floating licenses”
  - Software audit

Incident Handling

- Once an incident occurs, there are three possible cases:
  - The incident is clearly related to an application
  - The incident is related to a hardware or infrastructure failure
  - The cause of the incident is not clear

Summary

- Implementing DevOps practices requires management buy-in, which, in turn, requires champions who can convince management that DevOps practices are of benefit
- A business case for DevOps covers costs, benefits, risks and their mitigation, a rollout schedule, and success criteria
- Once a DevOps adoption process is under way, it is important to measure the success of the adoption, the compliance with the associated practices, and how well stakeholders are responding to the changes to their environment

For Further Reading

- You can find more information about business considerations at
  - The blog "DevOps Considerations"
  - The book Communications Networks in R&D Laboratories (Allen,1970)
  - Wikipedia's entry on change management
- Maturity models for DevOps, "A Continuous Delivery Maturity Model," July 17, 2013, InfoQ
- For understanding more about measuring rework, Damon Edwards' article is helpful