DevOps – Lecture 13

Industrial and Research Challenges and Future Scope

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Phases

Continuous Integration

- Plan
- Code
- Build
- Test

Continuous Deployment

- Deploy
- Operate
- Monitor

Continuous Monitoring

https://www.edureka.co/blog/devops-lifecycle/

https://medium.com/taptuit/the-eight-phases-of-a-devops-pipeline-fda53ec9bba

https://devopedia.org/devops


https://www.javatpoint.com/devops-lifecycle

https://www.educba.com/devops-lifecycle/

https://www.novelvista.com/blogs/devops/everything-you-need-to-know-about-devops
Research in several areas:

• Cloud/Infrastructure
• Automation
• Security
• IaC
• Monitoring
• Software quality
Cloud research

• Predicting cloud bill
• Optimizing resource requirement
  • For all types of applications
  • Scientific application
  • Big-data application
• Adaptive cloud service selection, based on requirements
  • Security requirement
  • Cost constraint
  • Time constraint
  • Trust and many more
• Standard
• Interoperability
Automation

• Automate different stages:
  • Deployment automation
  • Test automation
  • Infrastructure provisioning automation
  • Infrastructure management
  • Monitoring automation
  • Recovery automation

• How to analyze the code to find the bugs?
• Predict failure by analyzing the automation script
• Recommend post-failure action
• AI tools to learn from the incident history
Infrastructure as Code

• Current state is not enough
• Security smell in developing IaC
  • Default user
  • Password length
  • Hard-coded secrets
  • Unsecure communication
  • Weak cryptographic algorithm
  • ... ...
• Code-smell
• IaC for IoT
  • Smart city
  • Industrial IoT
  • Smart grid
• Defect-prediction
Security

• Security smell
• Code Smell
• Security in multi-cloud environment
• Security from
  • changing environment
  • New third-party tool Integration
  • third-party tool upgrade
• Static and dynamic penetration testing
• How would you handle False Positive report?
Software/Application Quality

• Role of DevOps features in Software quality
  • DevOps features
    • Culture, sharing, Fast feedback, automation, Continuous delivery and deployment, measurement, software architecture, DevOps practices
  • Quality attributes:
    • Flexibility, testability, usability, efficiency, maintainability, portability, reliability, security, reusability, interoperability

• How to measure quality?

• Role of microservices [ref]

• Code refactoring in software quality
Monitoring

• Efficient monitoring infrastructures
  • Frictionless (should not cause any slowdown)

• Monitoring agents
  • When to collect?
  • Where it resides?
  • How frequent to collect?
  • What to collect?
  • How to export?
  • Third-party integration?

• DevOps for IoT
  • Monitoring system availability
DevOps-like culture in other areas

• AIOps, MLOps
• DataOps
• DevSecOps
• Edge Computing
Future of DevOps

• Serverless Architecture
• Migration to microservice
• Wide use of Kubernetes
• Further maturing IaC
• More and more automation
• Wide use of AI
  • Leading to predictive DevOps
Lab Sessions

No Lab
References

- https://dl.acm.org/doi/abs/10.1145/800283.811113
- https://techbeacon.com/app-dev-testing/future-devops-21-predictions-2021
- https://techbeacon.com/app-dev-testing/future-devops-21-predictions-2021
Any Question?

THANK YOU