

DevOps with GitHub Actions – Lesson 1

Facilitated by Kent State University Topic: Foundations of GitHub Actions, Secrets Management, and Basic Monitoring Duration: 1 Hour

Learning Objectives

By the end of this lesson, participants will be able to:

- Understand GitHub Actions workflow basics
 - Configure GitHub Secrets for secure deployment (including SSH keys)
 - Run simple CI tasks inside workflows
 - Implement basic monitoring and notifications using email or SMS (Twilio)
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I. Introduction to GitHub Actions (10 minutes)

GitHub Actions provides automation for building, testing, and deploying software. It is defined through YAML files stored in the `.github/workflows` directory.

Key concepts:

- Workflows
- Jobs
- Steps
- Runners

Minimal example:

```
name: CI
on: [push]
jobs:
  build:
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v3
      - name: Run tests
        run: echo "Running tests..."
```

II. Secrets Management (15 minutes)

Secrets allow secure storage of credentials such as SSH private keys, API keys, or passwords.

Common secrets:

- `SSH_PRIVATE_KEY` for deployment

- `TWILIO_AUTH_TOKEN` for notifications
- `SMTP_PASSWORD` for outgoing mail

Workflow snippet to load SSH keys:

```
- name: Configure SSH
  run: |
    mkdir -p ~/.ssh
    echo "${{ secrets.SSH_PRIVATE_KEY }}" > ~/.ssh/id_rsa
    chmod 600 ~/.ssh/id_rsa
```

III. Basic Continuous Integration (10 minutes)

Typical CI tasks:

- Linting
- Running tests
- Packaging Python applications

Example with Python setup:

```
- name: Set up Python
  uses: actions/setup-python@v4
  with:
    python-version: "3.11"

- name: Install deps
  run: pip install -r requirements.txt

- name: Run tests
  run: pytest
```

IV. Basic Monitoring and Notifications (15 minutes)

If a workflow fails or succeeds, we can notify administrators.

A. Email Notification Example (simple SMTP)

```
- name: Send email on failure
  if: failure()
  run: |
    python send_email.py
```

Where `send_email.py` uses your SMTP credentials (stored in Secrets).

B. SMS Notification via Twilio

```
- name: Send SMS
  if: failure()
  run: |
    python notify_sms.py
```

Twilio credentials stored in Secrets:

- `TWILIO_ACCOUNT_SID`
- `TWILIO_AUTH_TOKEN`

V. Exercise (5 minutes)

Create a workflow that:

1. Checks out code
2. Runs a simple Python script
3. Sends an email if the script fails

VI. Recap and Q&A (5 minutes)

Key points:

- GitHub Actions automates CI and deployment
- Secrets management is required before any SSH or API-based deployments
- Basic monitoring gives immediate visibility into failures

Final multiple-choice question:

Which GitHub Actions feature stores credentials securely?

A. Variables B. Environment files C. Secrets D. Logs

Answer: C. Secrets