

# Deployment Strategies

*CSSE6400*

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## Branching & Deployment Strategies

- Branching Strategies
- Deployment Strategies
  - Recreate Deployment
  - Rolling Deployment
  - Blue/Green Deployment
  - Canary Deployment
  - A/B Deployment
  - Shadow Deployment

*Definition 0.* Branching

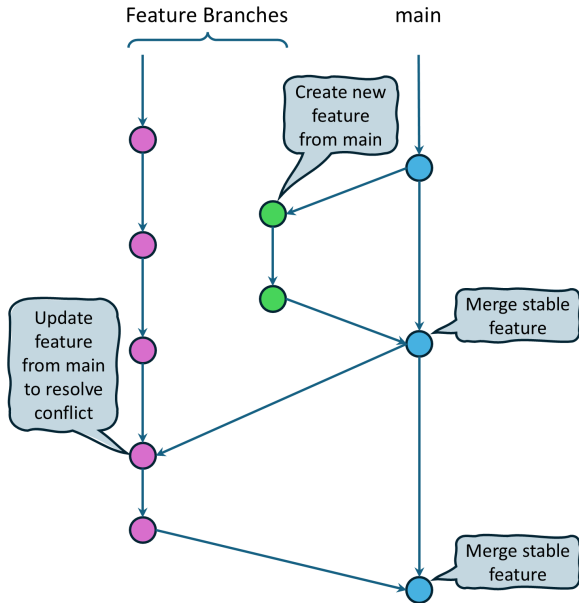
Copying the trunk to allow separate and parallel development.

# Branching Strategies

- GitHub Flow
- GitLab Flow
- Release Branches

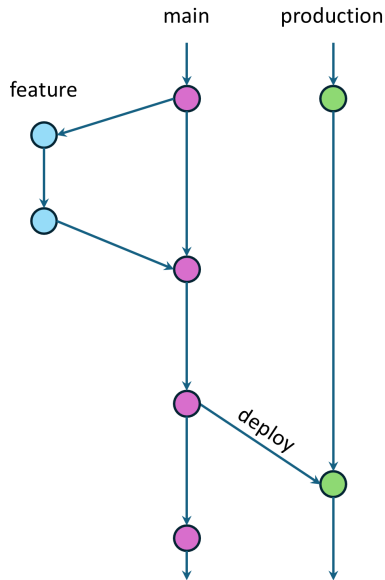
# GitHub Flow *[Haddad, 2022]*

- Main is always deployable
- Create branch
- Make changes
- Create pull request
- Resolve issues
- Merge pull request
- Delete branch



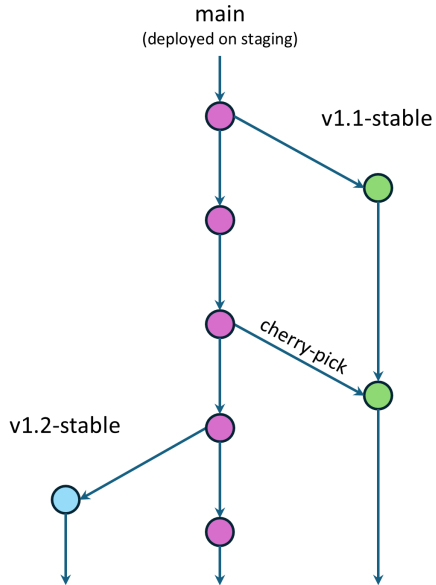
## GitLab Flow *[Saavedra, 2023]*

- Supports deployment windows
  - Merge to production
  - Deploy when allowed
- Production branch
  - Plus alpha, beta, ...
- Still have
  - Feature branches
  - Pull requests



## Release Branches *[Saavedra, 2023]*

- Supports multiple versions of system
- Feature development in main
- Released versions are branches
- Bug fixes in main
  - cherry-pick into branches



*Definition 0.* Deployment Strategy

How a software system is made available to clients.



# Recreate Deployment *[Tremel, 2017]*



## Recreate Deployment

### Pros

- Easy
- Renewed state
  - App reinitialised
  - Persistent storage consistent with system version

### Cons

- Downtime

# Rolling Deployment *[Tremel, 2017]*

## Rolling Deployment

### Pros

- Fairly easy
- Slow release of new version
  - Observe issues
  - Rollback
- Stateful instances can finish gracefully
  - Instance is killed when inactive

### Cons

- Time
- Support multiple APIs
- Support different versions of persistent data structure
- No control over traffic to different versions

# Blue-Green Deployment *[Tremel, 2017]*

## Blue-Green Deployment

### Pros

- Instant release of new version
- Fast rollback if necessary
- Only one version 'live' at any time
  - No versioning conflicts

### Cons

- Expensive
  - Double the infrastructure
- Stateful instance version switch difficult
  - Can't kill instance in middle of a transaction

# Canary Deployment *[Tremel, 2017]*

# Canary Deployment

## Pros

- New version released to subset of users
- Can monitor performance and error rates
- Easy and fast rollback

## Cons

- Slow
- Implies poor testing



# A/B Deployment *[Tremel, 2017]*

## A/B Deployment

### Pros

- Multiple versions run in parallel
- Full control over traffic distribution

### Cons

- Needs intelligent load balancer
- Debugging a version is difficult
  - Need good logs & tools

# Shadow Deployment *[Tremel, 2017]*

# Shadow Deployment

## Pros

- Performance testing with production traffic
- No impact on users

## Cons

- Expensive
  - Double the infrastructure
- Complex to setup
  - Need mocks for external services

## Deployment Strategy Options

- Staging or beta testing
  - Recreate or Rolling
- Production (Live)
  - Rolling or Blue/Green
- Uncertain of system stability
  - Canary
- Evaluation
  - A/B or Shadow

# Deployment Considerations *[Tremel, 2017]*

Strategy	ZERO DOWNTIME	REAL TRAFFIC TESTING	TARGETED USERS	CLOUD COST	ROLLBACK DURATION	NEGATIVE IMPACT ON USER	COMPLEXITY OF SETUP
<b>RECREATE</b> version A is terminated then version B is rolled out	✗	✗	✗	■ □ □	■ ■ ■	■ ■ ■	□ □ □
<b>RAMPED</b> version B is slowly rolled out and replacing version A	✓	✗	✗	■ □ □	■ ■ ■	■ □ □	■ □ □
<b>BLUE/GREEN</b> version B is released alongside version A, then the traffic is switched to version B	✓	✗	✗	■ ■ ■	□ □ □	■ ■ ■	■ ■ □
<b>CANARY</b> version B is released to a subset of users, then proceed to a full rollout	✓	✓	✗	■ □ □	■ □ □	■ □ □	■ ■ □
<b>A/B TESTING</b> version B is released to a subset of users under specific condition	✓	✓	✓	■ □ □	■ □ □	■ □ □	■ ■ ■
<b>SHADOW</b> version B receives real world traffic alongside version A and doesn't impact the response	✓	✓	✗	■ ■ ■	□ □ □	□ □ □	■ ■ ■

## References

[Haddad, 2022] Haddad, R. (2022).

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git-branching-strategies-in-2022/](https://faun.dev/c/stories/manuelherrera/git-branching-strategies-in-2022/).

[Saavedra, 2023] Saavedra, C. (2023).

Combine gitlab flow and gitlab duo for a workflow powerhouse.

<https://about.gitlab.com/blog/2023/07/27/gitlab-flow-duo/>.

[Tremel, 2017] Tremel, E. (2017).

Six strategies for application deployment.

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