

# 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

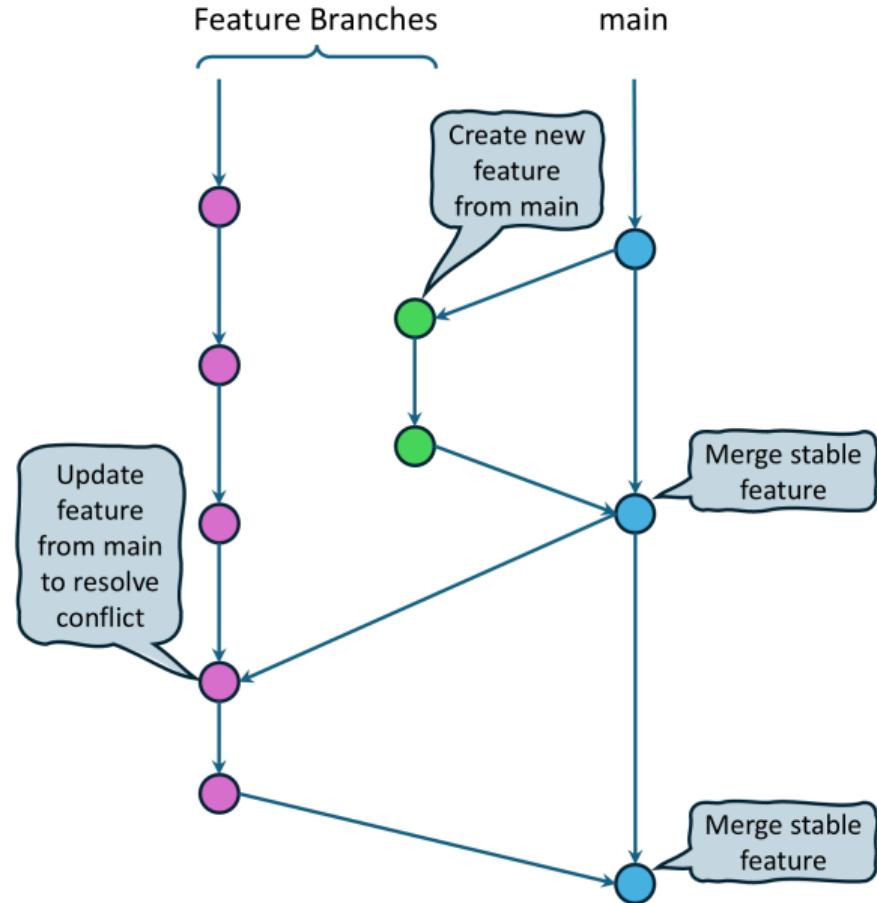
Copying the trunk to allow separate and parallel development.

## Branching Strategies

- GitHub Flow
- GitLab Flow
- Release Branches

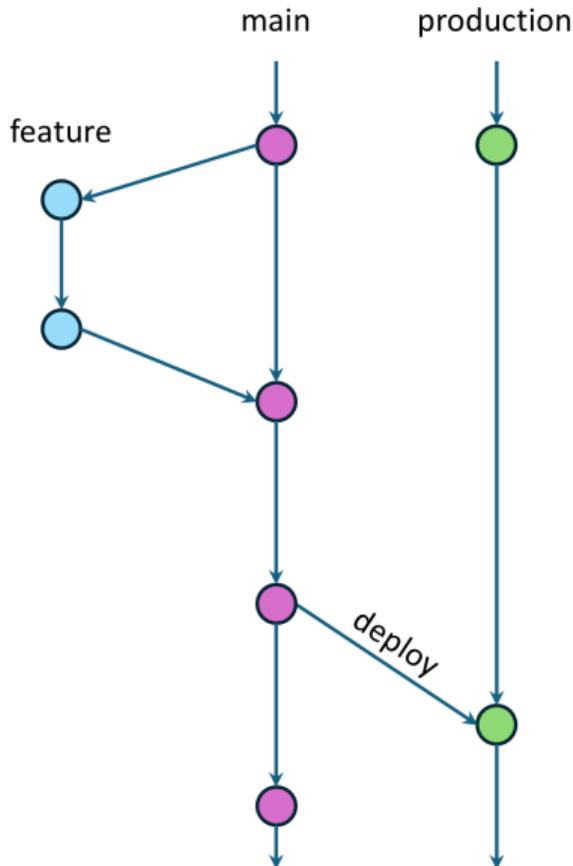
# GitHub Flow [Haddad, 2022]

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



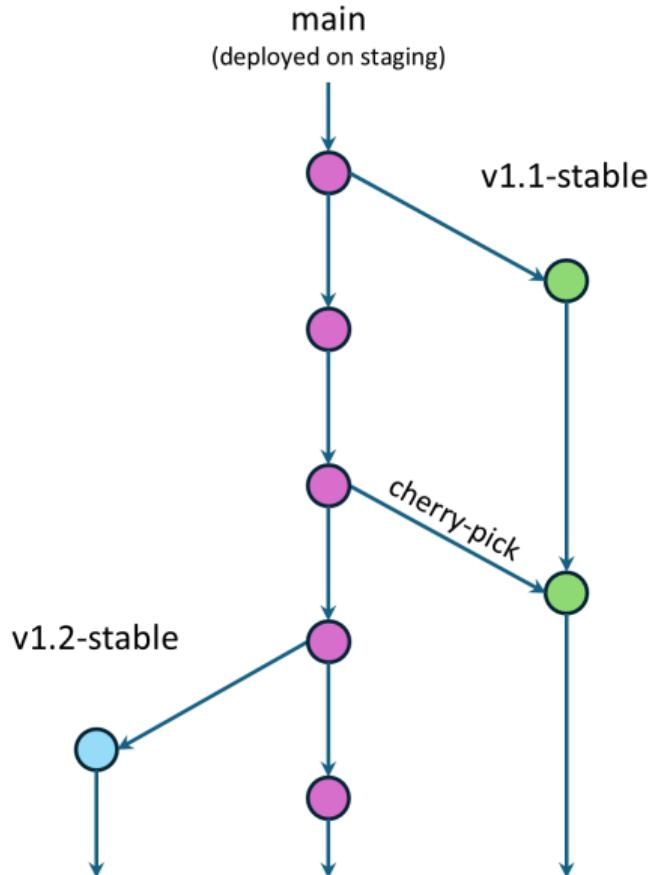
# GitLab Flow [Saavedra, 2023]

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



## Release Branches [Saavedra, 2023]

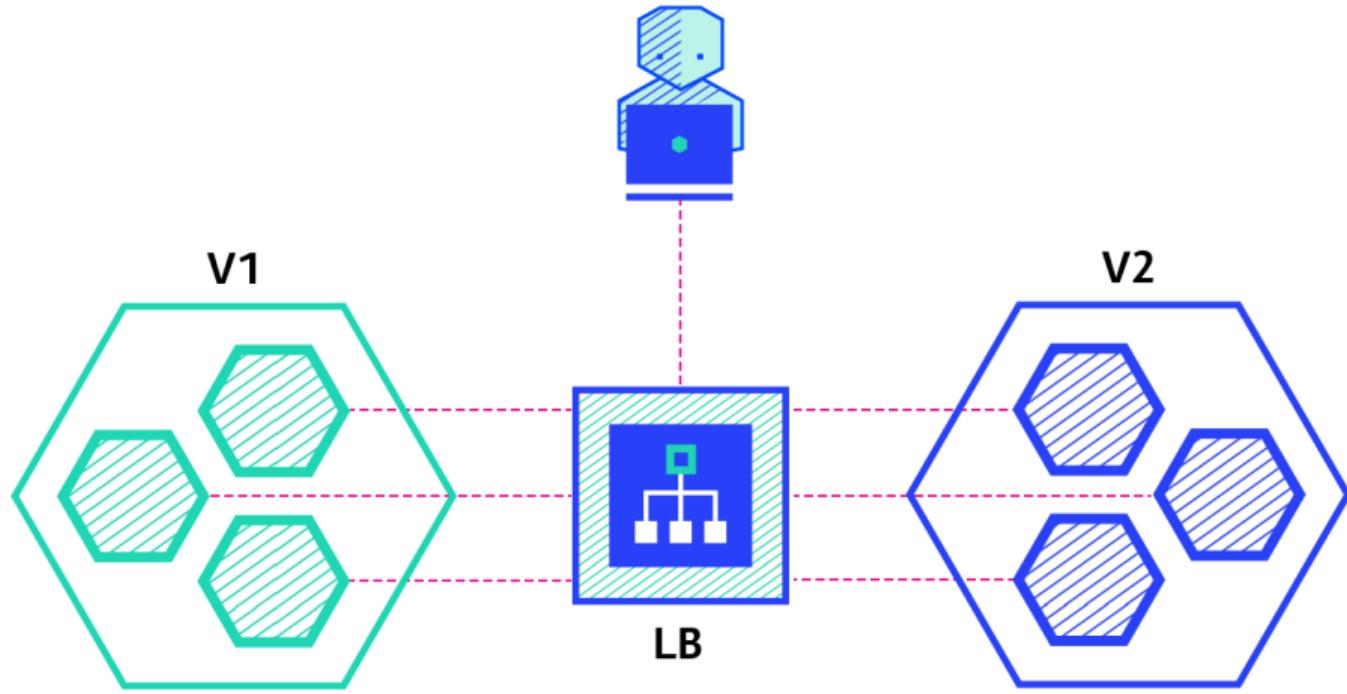
- Supports multiple *versions* of system
- Feature development in main
- Released versions are branches
- Bug fixes in main
  - cherry-pick into branches



*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

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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).  
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