# 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

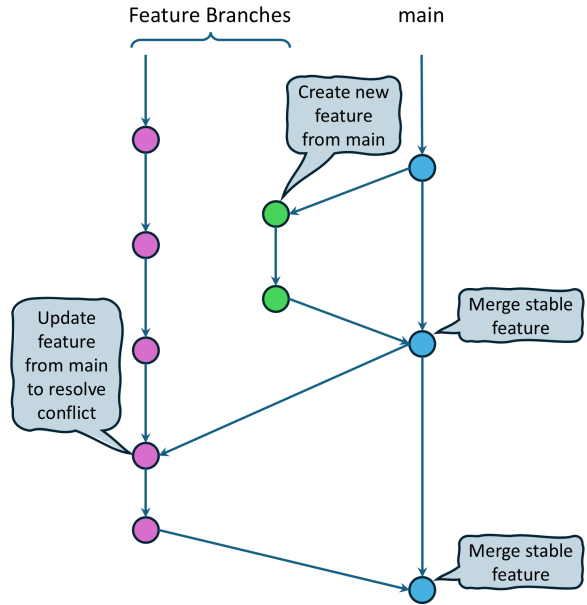
Copying the trunk to allow separate and parallel development.

# Branching Strategies

- GitHub Flow
- GitLab Flow
- Release Branches

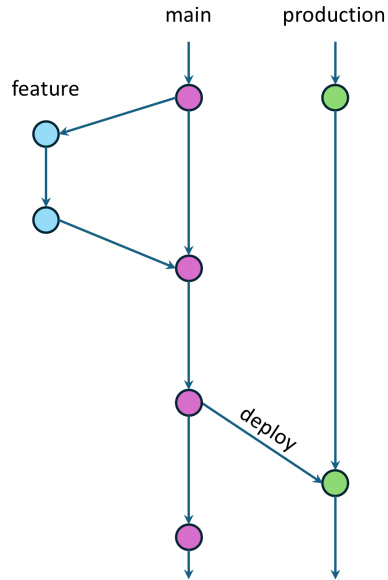
# GitHub Flow *[Haddad, 2022]*

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



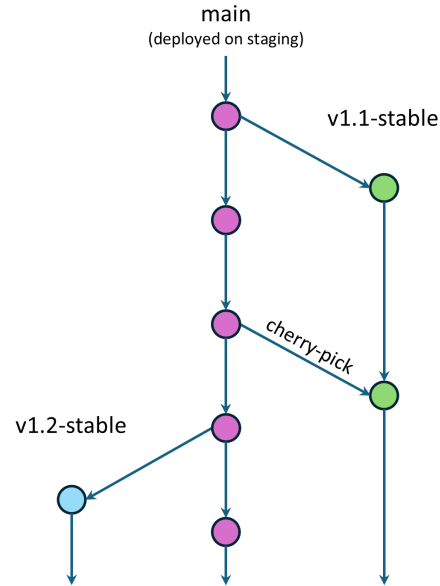
# GitLab Flow [Saavedra, 2023]

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



# Release Branches *[Saavedra, 2023]*

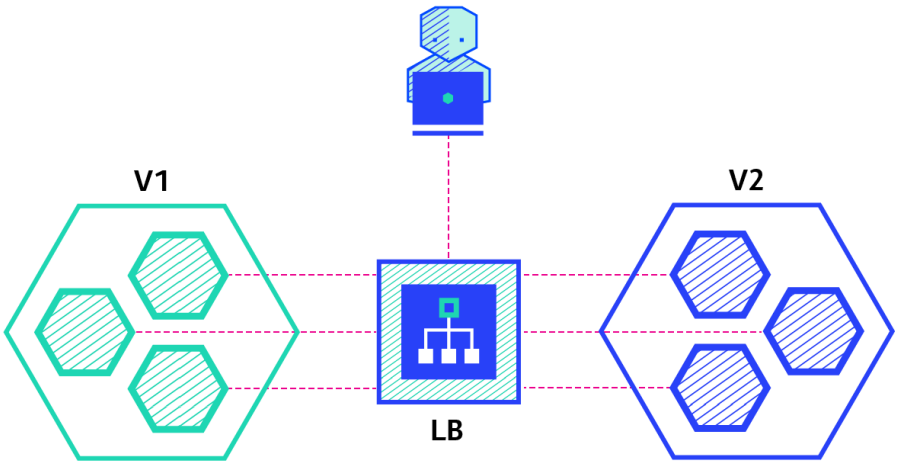
- Supports multiple *versions* of system
- Feature development in main
- Released versions are branches
- Bug fixes in main
  - cherry-pick into branches



*Definition 0.* Deployment Strategy

How a software system is made available to clients.

# Recreate Deployment [Tremel, 2017]



## Recreate Deployment

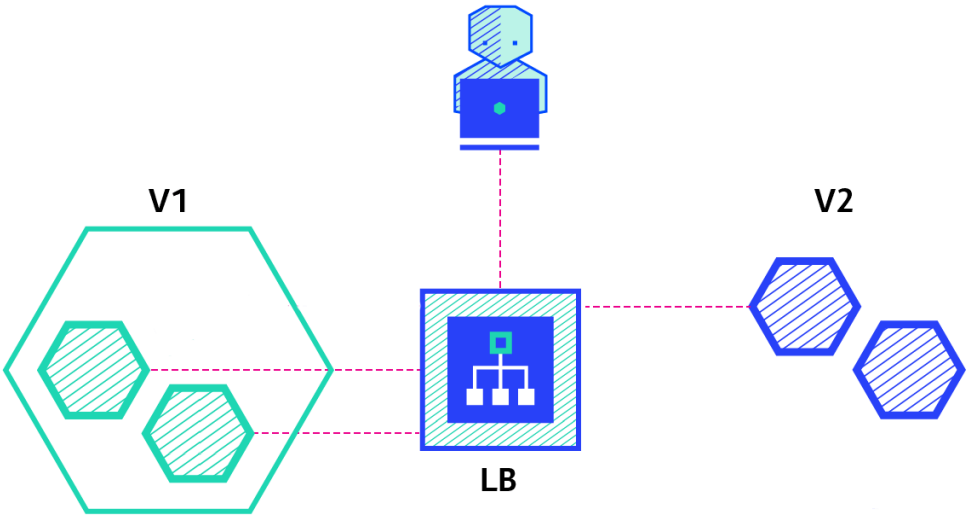
### Pros

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

### Cons

- Downtime

# Rolling Deployment [Tremel, 2017]



## Rolling Deployment

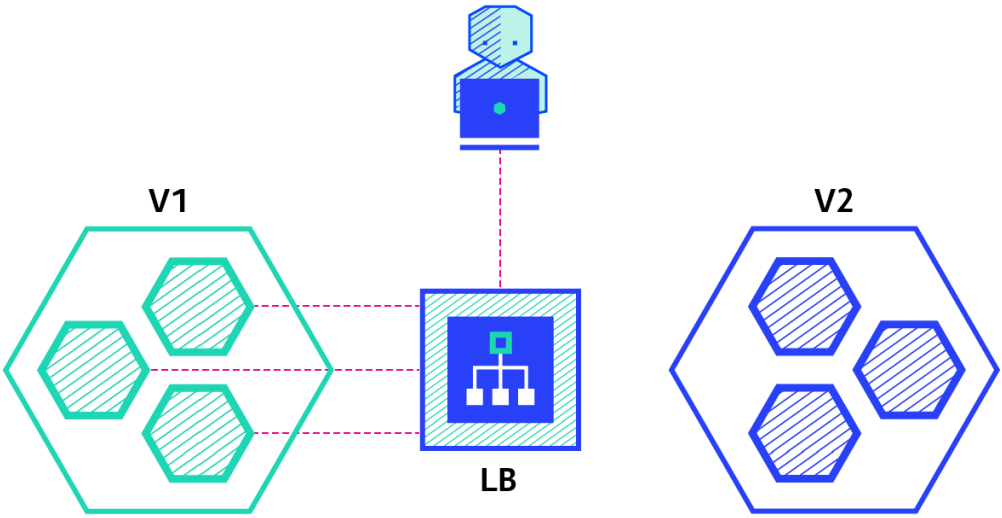
### Pros

- 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

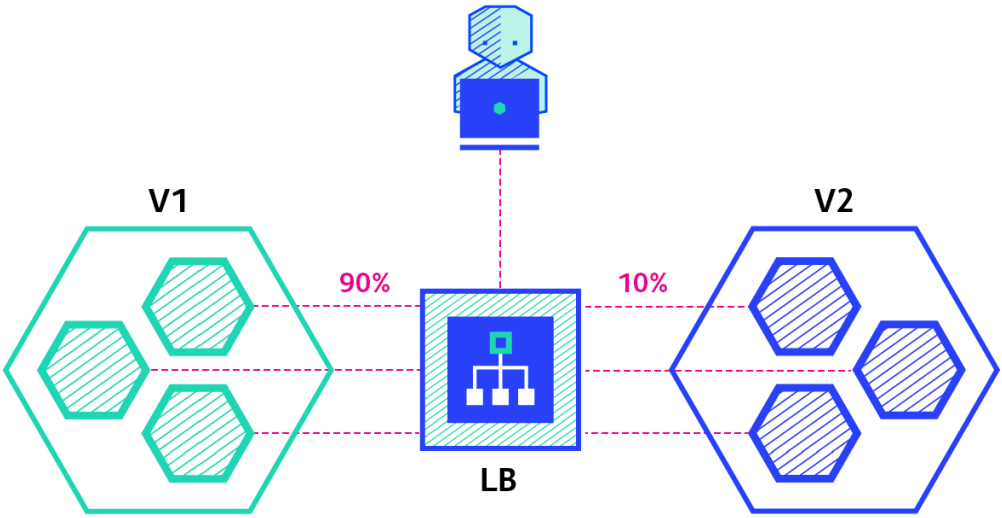
## Pros

- 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

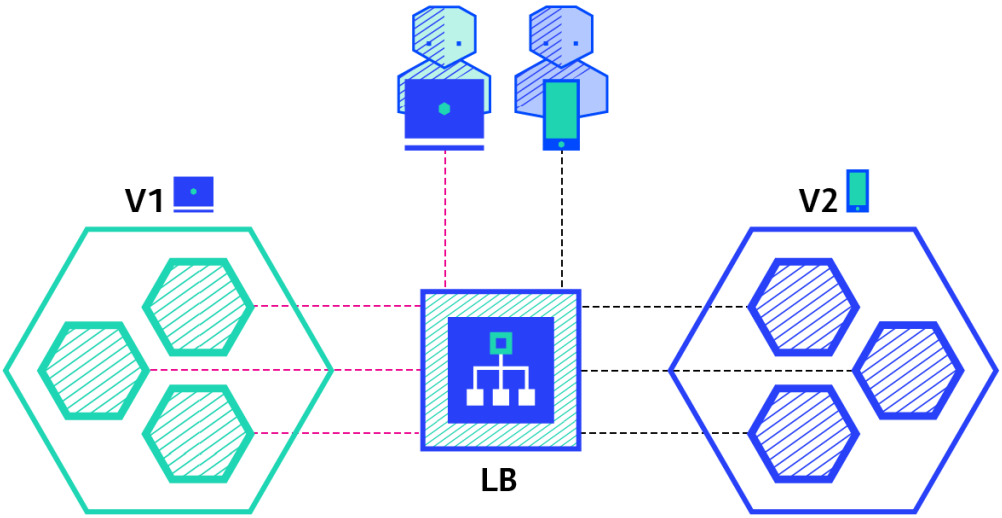
### Pros

- 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

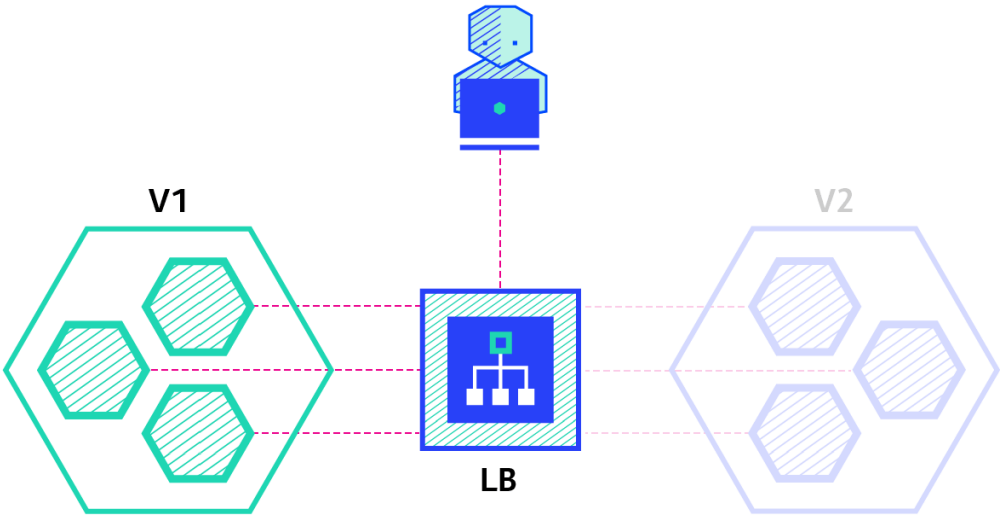
## Pros

- 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 |
|---|---|---|---|---|---|---|---|
| **RECREATE** version A is terminated then version B is rolled out | ✗ | ✗ | ✗ | ■□□ | ■■■ | ■■■ | □□□ |
| **RAMPED** version B is slowly rolled out and replacing version A | ✓ | ✗ | ✗ | ■□□ | ■■□ | ■□□ | ■□□ |
| **BLUE/GREEN** version B is released alongside version A, then the traffic is switched to version B | ✓ | ✗ | ✗ | ■■■ | □□□ | ■■□ | ■■□ |
| **CANARY** version B is released to a subset of users, then proceed to a full rollout | ✓ | ✓ | ✗ | ■■□ | ■□□ | ■□□ | ■■□ |
| **A/B TESTING** version B is released to a subset of users under specific condition | ✓ | ✓ | ✓ | ■■□ | ■□□ | ■□□ | ■■■ |
| **SHADOW** version B receives real world traffic alongside version A and doesn't impact the response | ✓ | ✓ | ✗ | ■■■ | □□□ | □□□ | ■■■ |

## References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