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Magento®

LEAD THE CHARGE

Developing and Deploying Magento with Composer: *Best Practices*

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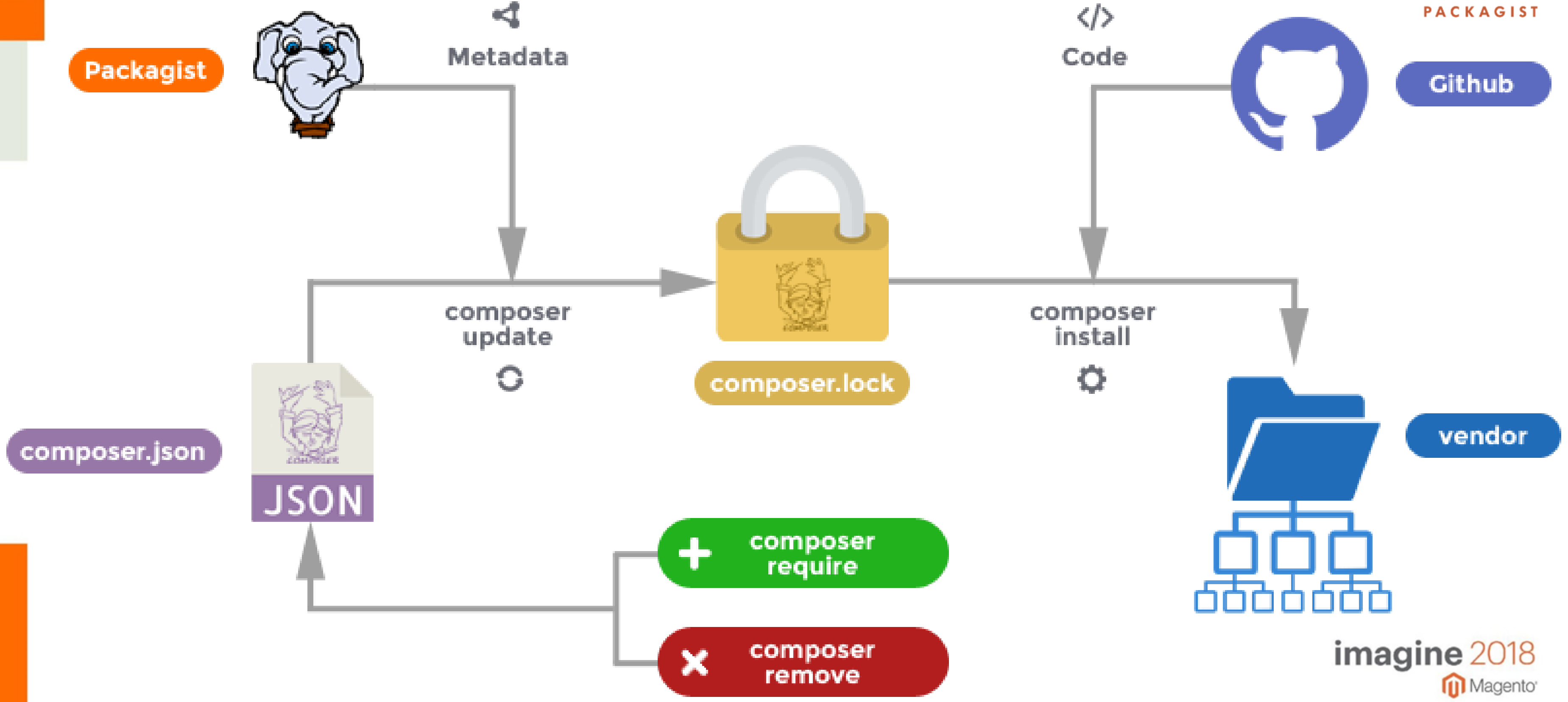

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Package Repositories

Third Parties

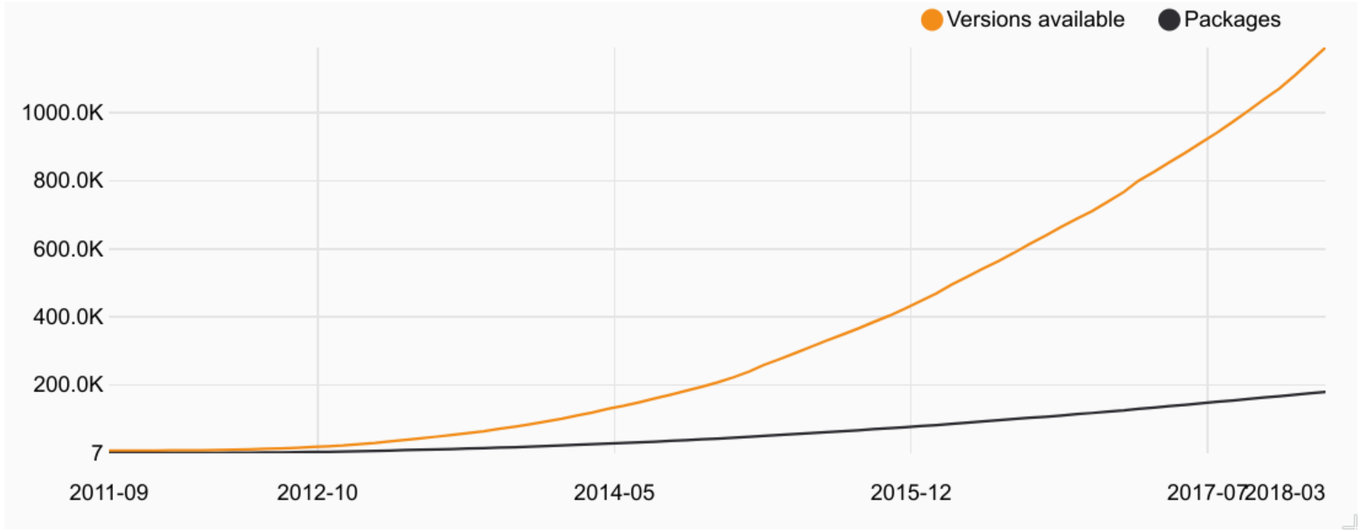
- Packagist - https://packagist.org
- Magento Marketplace - https://marketplace.magento.com
- Individual vendors’ repositories

Private Packages

- Any Git/svn/Mercurial/… repository
- GitHub, Bitbucket, GitLab, …
- Private Packagist - https://packagist.com

Leveraging Open-Source Packages

- Nearly 200k packages on packagist.org
  - Many useful well tested, maintained and secure packages
  - Large amounts of unmaintained, insecure, broken or poorly working PHP code



Leveraging Open-Source Packages

- Evaluate packages every time before you write code yourself

- Selection criteria
  - Quality of documentation (changelogs?)
  - Development activity (commits, issues, PRs)
  - Number of maintainers
  - Installation counts, GitHub stars
  - Complexity

- It’s all trade-offs - no golden rule

Magento Marketplace

- Apply similar criteria as for Open-Source packages

- Additional factors to consider for choosing packages
  - Cost
  - Licenses
  - Reviews / Ratings
  - Extension Quality Program

Using your private code with Composer

```
-   "repositories": [
            {"type": "path", "url": "../core"}
    ],
-   "repositories": [
            {"type": "vcs",
             "url": "https://github.com/naderman/symfony" }
    ],
-   "repositories": [
            {"type": "composer",
             "url": "https://repo.packagist.com/my-org/" }
    ],
```

Development Environment *Best Practices*

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Create-project instead of cloning

-
  ```
  composer create-project --repository-url=https://repo.magento.com/ magento/project-community-edition <path>
  ```

  - composer.json will have the correct contents
    - different from forking the community edition

- magento/project-community-edition is a metapackage
  - no code
  - defines dependencies on a number of other packages

- Only clone if you’re trying to contribute to a repository directly

Managing Updates: Constraints

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- **Exact Match:**	1.0.0	1.2.3-beta2	dev-master
- **Wildcard Range:**	1.0.*	2.*	
- **Hyphen Range:**	1.0-2.0 >=1.0.0 <2.1	1.0.0 - 2.1.0 >=1.0.0 <=2.1.0	
- *(Unbounded Range: Bad!*	*>= 1.0)*		
- **Next Significant Release**	~1.2 >=1.2.0 <2.0.0	~1.2.3 >=1.2.3 <1.3.0	
- **Caret/Semver Operator**	^1.2 >=1.2.0 <2.0.0	^1.2.3 >=1.2.3 <2.0.0	**Best Choice for Libs**

Operators: “ “ AND, “||” OR

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Managing Updates: Stabilities

- **Order**

  dev -> alpha -> beta -> RC -> stable

- **Automatically from tags**

1.2.3	-> stable
1.3.0-beta3	-> beta

- **Automatically from branches**

Branch	-> Version (Stability)
2.0	-> 2.0.x-dev (dev)
master	-> dev-master (dev)
myfeature	-> dev-myfeature (dev)

- **Choosing**

```
"foo/bar": "1.3.*@beta"
"foo/bar": "2.0.x-dev"

"minimum-stability": "alpha"
```

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Managing Updates: Semantic Versioning

x.y.z

(BC-break).(new functionality).(bug fix)

https://semver.org/

Managing Updates: Semantic Versioning

Promise of Compatibility

X.Y.Z

- Must be used consistently

  Dare to increment **X**!
- Only valuable if BC/Compatibility promise formalized
  - http://devdocs.magento.com/guides/v2.0/contributor-guide/backward-compatible-development/
  - http://symfony.com/doc/current/contributing/code/bc.html
  - Document in Changelog

Updating

- `composer update`
  - no isolation of problems unless run very frequently

- `composer update <package...>`
  - explicit conscious updates

- `composer update --dry-run [<package...>]`
  - Understanding and preparing effects of updates
  - Read CHANGELOGs
  - `composer outdated`

Managing Updates: Unexpected results

- **`composer why [--tree] foo/bar`**

  ```
  mydep/here 1.2.3 requires foo/bar (^1.0.3)
  ```

- **`composer why-not [--tree] foo/bar ^1.2`**

  ```
  foo/bar 1.2.3 requires php (>=7.1.0 but 5.6.3 is
  installed)
  ```

Managing Updates: Partial Updates

```
{       “name”: “zebra/zebra”,
        “require”: {
                “horse/horse”: “^1.0” }}

{       “name”: “giraffe/giraffe”,
        “require”: {
                “duck/duck”: “^1.0” }}
```

Managing Updates: Partial Updates

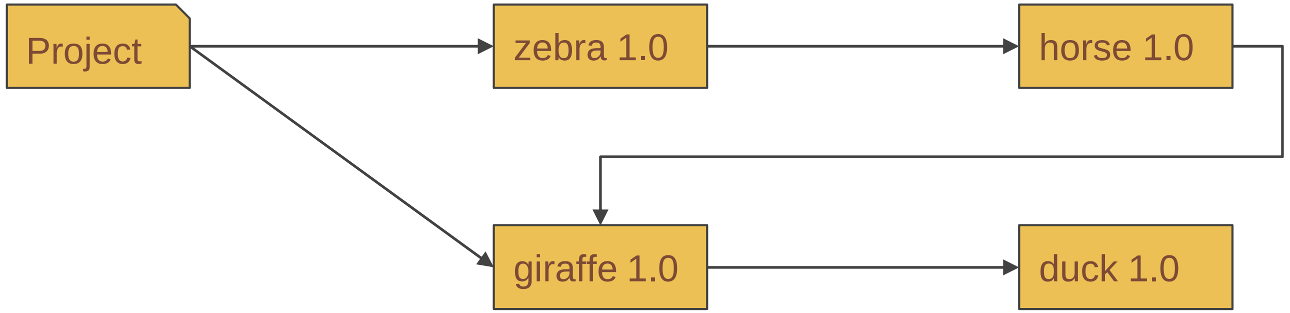
```
{       “name”: “horse/horse”,
        “require”: {
                “giraffe/giraffe”: “^1.0” }}

{       “name”: “duck/duck”,
        “require”: {}}
```

Managing Updates: Partial Updates

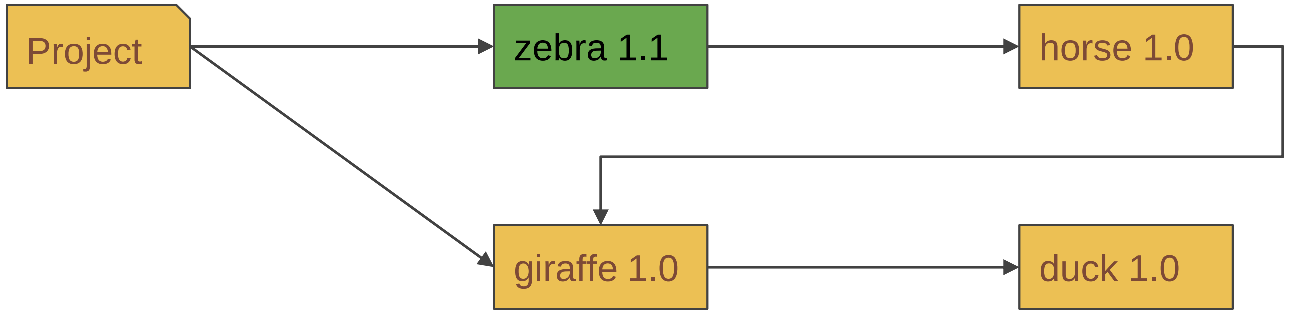
```
{
        “name”: “my-project”,
        “require”: {
                “zebra/zebra”: “^1.0”,
                “giraffe/giraffe”: “^1.0”
        }
}
```

Managing Updates: Partial Updates



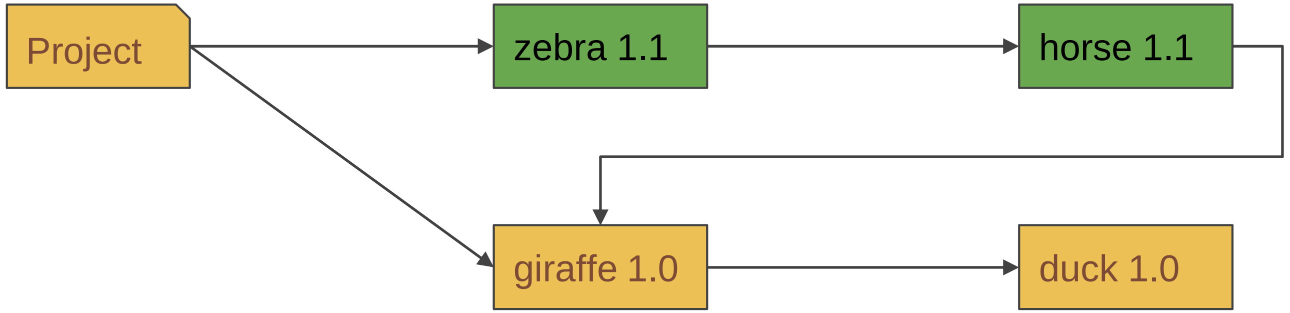
```
Now each package releases 1.1
```

Managing Updates: Partial Updates



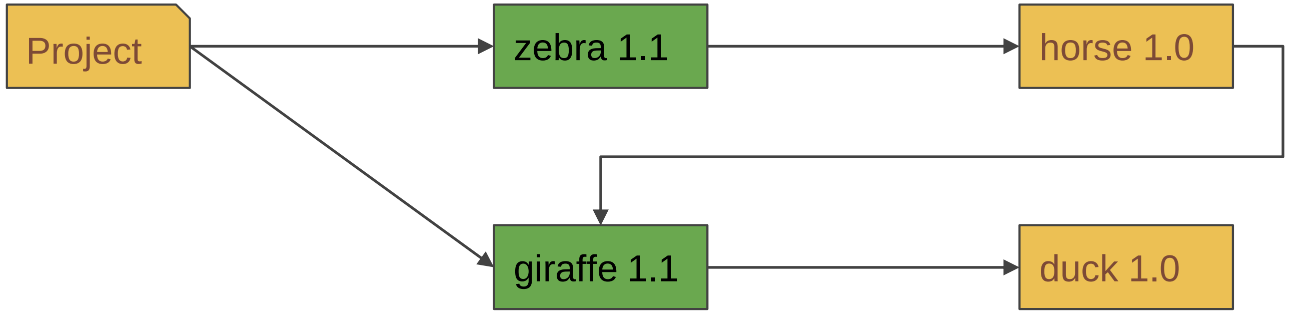
```
$ composer update --dry-run zebra/zebra
      Updating zebra/zebra (1.0 -> 1.1)
```

Managing Updates: Partial Updates



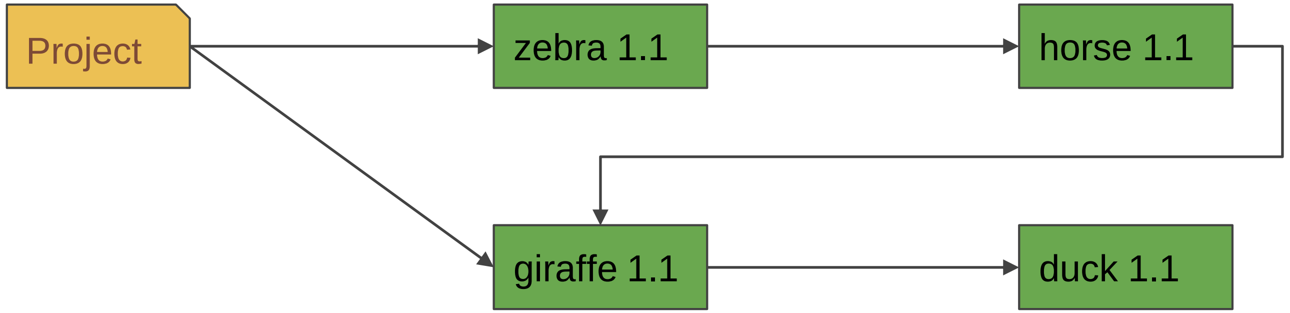
```
$ composer update --dry-run zebra/zebra --with-dependencies
      Updating horse/horse (1.0 -> 1.1)
      Updating zebra/zebra (1.0 -> 1.1)
```

Managing Updates: Partial Updates



```
$ composer update --dry-run zebra/zebra giraffe/giraffe
      Updating zebra/zebra (1.0 -> 1.1)
      Updating giraffe/giraffe (1.0 -> 1.1)
```

Managing Updates: Partial Updates



```
$ composer update zebra/zebra giraffe/giraffe --with-dependencies
        Updating duck/duck (1.0 -> 1.1)
        Updating giraffe/giraffe (1.0 -> 1.1)
        Updating horse/horse (1.0 -> 1.1)
        Updating zebra/zebra (1.0 -> 1.1)
```

Managing Updates: The Lock File

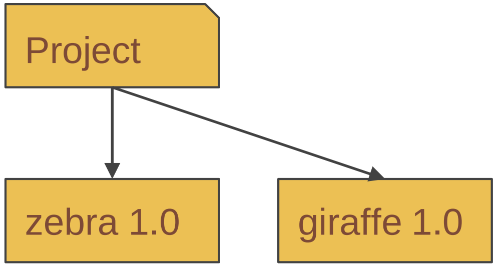
- Contents
  - All dependencies including transitive dependencies
  - Exact version for every package
  - Download URLs (source, dist, mirrors)
  - Hashes of files
- Purpose
  - **Reproducibility** across teams, users and servers
  - **Isolation** of bug reports to code vs. potential dependency breaks
  - **Transparency** through explicit updating process

Commit The Lock File

Every composer install without a lock file is a catastrophe waiting to happen

The Lock File Will Conflict

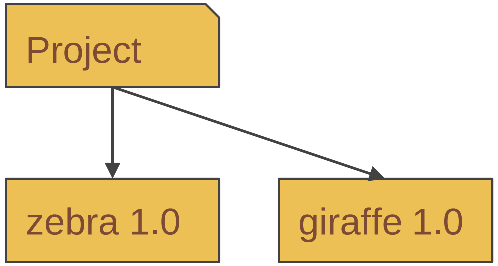
Day 0: “Initial Commit”



master

composer.lock

- zebra	1.0
- giraffe	1.0

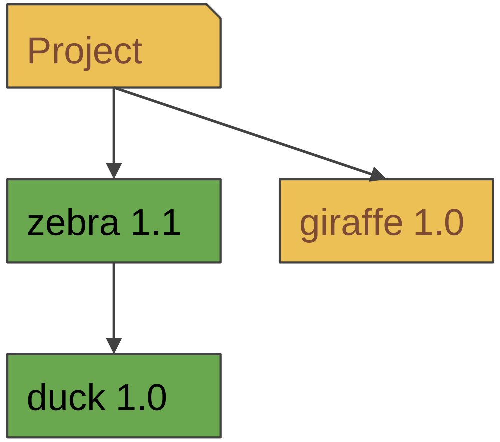


dna-upgrade

composer.lock

- zebra	1.0
- giraffe	1.0

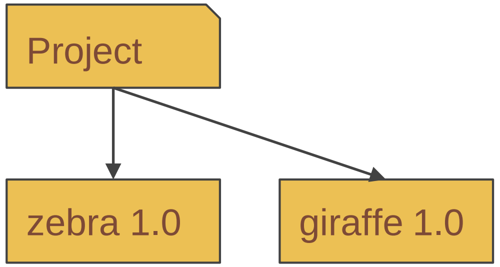
Week 2: Strange new zebras require duck



master

composer.lock

- zebra	1.1
- giraffe	1.0
- duck	1.0



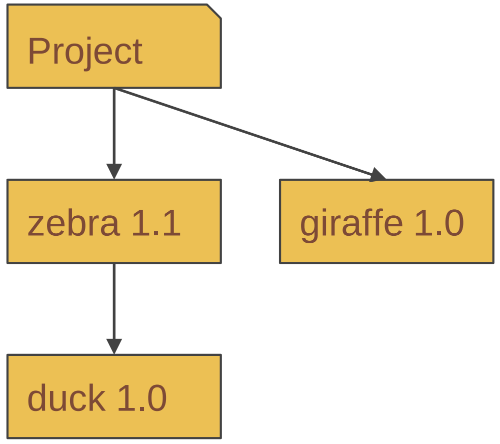
dna-upgrade

composer.lock

- zebra	1.0
- giraffe	1.0

Week 3: Duck 2.0

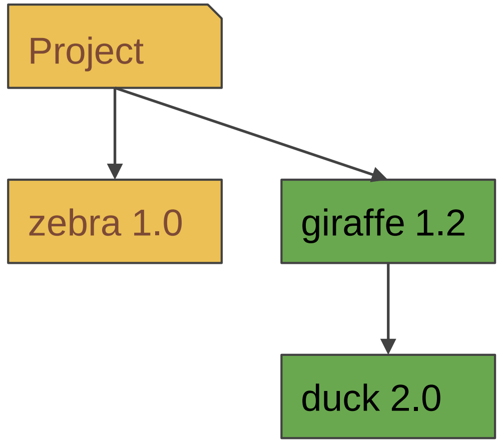
Week 4: Giraffe evolves, requires duck 2.0



master

composer.lock

- zebra	1.1
- giraffe	1.0
- duck	1.0

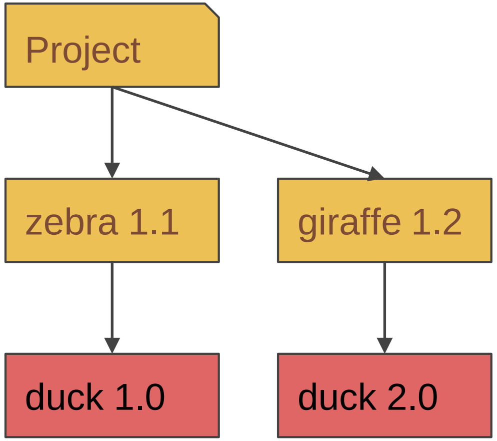


dna-upgrade

composer.lock

- zebra	1.0
- giraffe	1.2
- duck	2.0

Text-based Merge



master

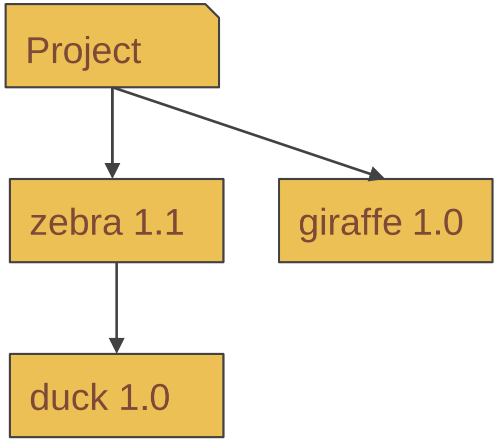
composer.lock

- zebra	1.1
- giraffe	1.2
- duck	**1.0**
- duck	**2.0**

Merge results in invalid dependencies

Reset composer.lock

```
git checkout <refspec> -- composer.lock
git checkout master -- composer.lock
```



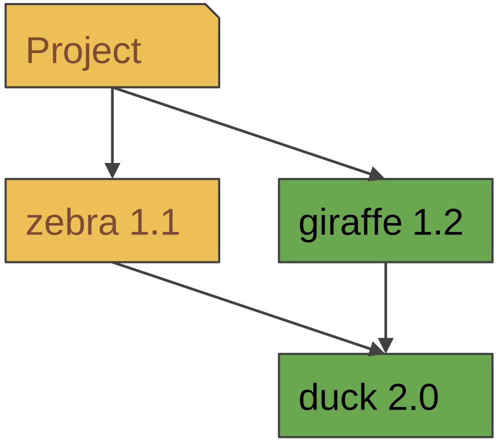
dna-upgrade

composer.lock

- zebra	1.1
- giraffe	1.0
- duck	1.0

Apply the update again

```
composer update giraffe
  --with-dependencies
```


$$\begin{tikzcd}
\text{Project} \arrow[d] \arrow[dr] & \\
\text{zebra 1.1} \arrow[dr] & \text{giraffe 1.2} \arrow[d] \\
 & \text{duck 2.0}
\end{tikzcd}$$

master

composer.lock

- zebra	1.1
- giraffe	1.2
- duck	2.0

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Resolving composer.lock merge conflicts

- composer.lock cannot be merged without conflicts
  - contains hash over relevant composer.json values

- `git checkout <refspec> -- composer.lock`
  - `git checkout master -- composer.lock`

- Repeat: `composer update <list of deps>`
  - Store parameters in commit message
  - Separate commit for the lock file update

Publishing packages

- `composer validate`
  - Will inform you about problems like missing fields and warn about problematic choices like unbound version constraints

- Do not publish multiple packages under the same name, e.g. CE/EE
  - **Names must be unique**

Continuous Integration for Packages

- Multiple runs
  - `composer install` from lock file
  - `composer update` for latest deps
  - `composer update --prefer-lowest --prefer-stable` for oldest (stable) deps

- Potentially multiple composer.json files with different platform configurations
  - `COMPOSER=composer-customer1.json php composer.phar update`
  - `COMPOSER=composer-customer1.json php composer.phar install`
  - Takes away benefit of “composer install” just working on any PHP project, so avoid this except for testing

Development Tools

- **require-dev** in composer.json
  - These packages won't be installed if you run `composer install --no-dev`
  - Use for testing tools, code analysis tools, etc.

- **`--prefer-source`**
  - Clone repositories instead of downloading and extracting zip files
  - Default behavior for dev versions
  - Allows you to push changes back into dependency repos

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Deployment
Best Practices

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What properties should deployment have?

- Unreliable or slow deployment process
  - You will be scared to deploy
  - You will not enjoy deploying
- Consequence: You will not deploy often
  - Infrequent deploys increase risks
    - You will not be able to spot problems as quickly
    - Problems will fester over time
- Vicious Cycle
  - **Reliability and speed** are key to breaking it

Composer install performance

- `--prefer-dist`
    - Will always download zip files over cloning repositories

- Store `~/.composer/cache/` between builds
    - How depends on CI product/setup you use

Autoloader Optimization

- `composer install` **`--optimize-autoloader`**
  - `composer dump-autoload --optimize`

- `composer install --optimize-autoloader` **`--classmap-authoritative`**
  - `composer dump-autoload --optimize --classmap-authoritative`

- `composer install --optimize-autoloader` **`--apcu-autoloader`**
  - `composer dump-autoload --optimize --apcu`

https://getcomposer.org/doc/articles/autoloader-optimization.md

Reduce dependence on external services

- **Build process *(move more into this)***
  - Install dependencies (Composer, npm, …)
  - Generate assets (Javascript, CSS, ...)
  - Create an artifact with everything in it

- **Deployment process *(make this as small as possible)***
  - Move the artifact to your production machine
    - sftp, rsync, apt-get install, ...
  - Machine dependent configuration
  - Database modifications
  - Start using new version

Never Deploy Without composer.lock

Reduce dependence on external services

- Composer install loads packages from URLs in composer.lock
  - Packagist.org is metadata only
  - *Open-source dependencies could come from anywhere*

- Solutions to unavailability
  - Composer cache in `~/.composer/cache`
    - Unreliable, not intended for this use
  - Fork every dependency
    - huge maintenance burden
  - Your own Composer repository mirroring all packages
    - e.g. Private Packagist

Summary

Development

- Make a checklist for new dependencies
- composer create-project
- SemVer: Don’t be afraid to increase the major version
- Formalize BC promises for users of your libraries
- composer update [--dry-run] <package>
- git checkout <branch> -- composer.lock
    - replay composer update
- Document changes to dependencies

Deployment

- composer install --prefer-dist --optimize-autoloader –no-dev
- Use a highly available Composer repository (Private Packagist)
- Deploy more frequently
- Focus on reliability and speed of your deployment process
- Deploying should not be scary

When Deployment goes wrong

- Your site may go down
- You lose orders
- You lose customers
- Customer support has more work
- Developers stressed to get site back up and running
  - More likely to make further mistakes

Typical Deployment Problems

- Manual Error
- Bugs in deployment scripts result in partial deploys
- Inconsistent state across multiple servers
- External services used in the process fail or timeout
  - Required dependencies unavailable for download
- Site unavailable or showing errors during deployment process

Improving your Deployment Process

- **Iterative Improvements**
    - Don’t have to happen in the presented order

- Documenting the current process
- Start automating individual steps
- Change your attitude
    - **Deploy more often**
        - even though it’s scary, it will make deployment less scary
        - to really feel what the pain points are
    - Management buy-in required, this will hurt at first

Improving your Deployment Process

- Continuous Integration
  - Yes PHP projects have a build process

- Staging Environment
  - As close to real production system as possible

- Full Automation
  - Configuration Management

- Continuous Deployment

No-Downtime Database Migrations

- *Adding* database schema element
  1. Add schema element
  2. Update code to fill and then use the new column/table/index/…

- *Removing* database schema element
  1. Update code to stop accessing/using the column/table/index/…
  2. Remove schema element

No-Downtime Database Migrations

- Deployment order (covers adding elements)
  1. Migrate Database Schema
  2. Switch Servers to use new code

- Removing an element requires deploying twice
  1. Deploy without database change
  2. Deploy only the database change with unmodified code

- Migration must keep database operational
  - MySQL Online DDL https://dev.mysql.com/doc/refman/5.7/en/innodb-create-index-overview.html

Deploying with Symlinks

-
  ```
  /var/www/current -> /var/www/20180321
  /var/www/20180310
  /var/www/20180321
  /var/www/20180418
  ```

-
  ```
  ln -sfT /var/www/20180418 /var/www/current
  ```

- Problems
  - APC/Opcache do not notice change
    - file is still at /var/www/current/index.php
  - Requests which are executed while the link changes
    - Some code from old version, some from new version

Deploying with Symlinks

- Solutions
    - Restarting fpm on deploy
        - Causes downtime
    - cachetool to clear apc/opcache
        - https://github.com/gordalina/cachetool
    - Nginx: change `$document_root` to `$realpath_root`
        - Resolves symlink before passing path to PHP
          => No risk of requests using partial code from new & old versions
    - Apache: https://github.com/etsy/mod_realdoc

    - Read https://codeascraft.com/2013/07/01/atomic-deploys-at-etsy/
      (by Rasmus Lerdorf)

Blue-Green Deployments

- Two identical sets of production machines: BLUE & GREEN
- Load balancer sends traffic to one system (BLUE)

- Deployment process
  - Set everything up on unused machines (GREEN)
  - Test functionality on GREEN system
  - Switch all traffic from load balancer to GREEN system
  - BLUE system is now idle, can be used for next deploy

Blue-Green Deployments

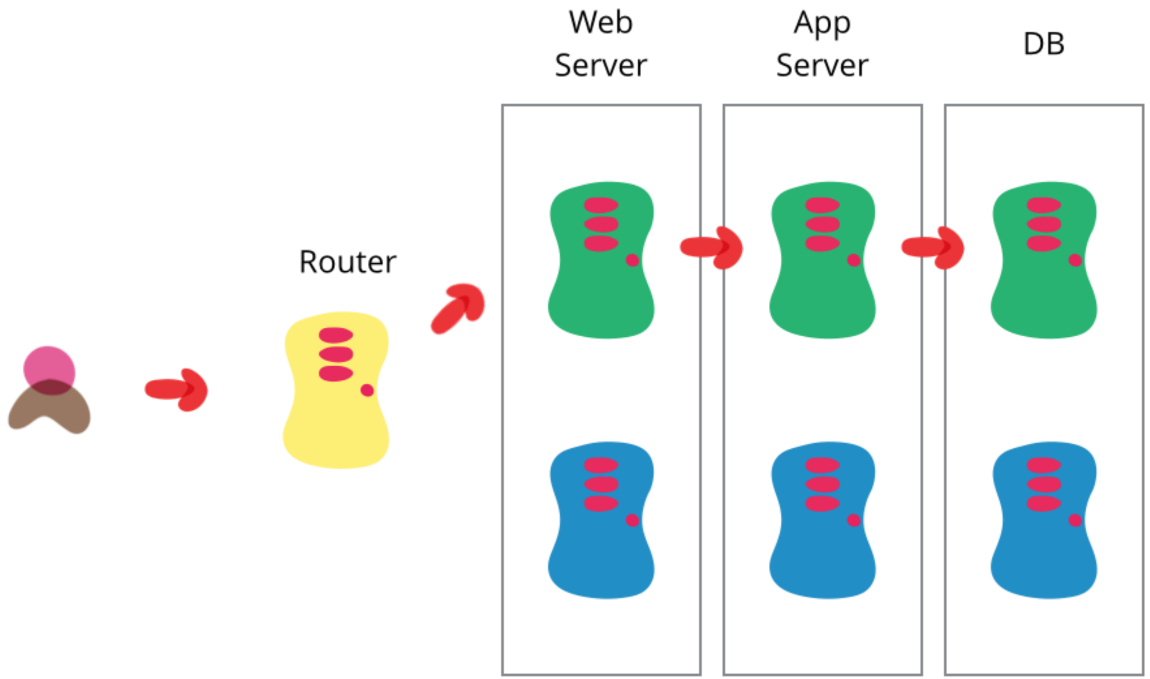

Illustration by Martin Fowler https://martinfowler.com/bliki/BlueGreenDeployment.html

Blue-Green Deployments

- Advantages
  - No risk of stale cache contents
  - None of the symlink issues
  - Deployment won’t impact live production system
  - Easy rollback (just point the load balancer back)

- Downsides
  - Double the hardware requirements
  - Long running processes may be running on non-live hardware
  - Doesn’t simplify database migrations

Use a PaaS (Platform as a Service) / Cloud provider which handles this for you

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