# Composer Best Practices *2018*

**Nils Adermann**
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**Private Packagist**
https://packagist.com

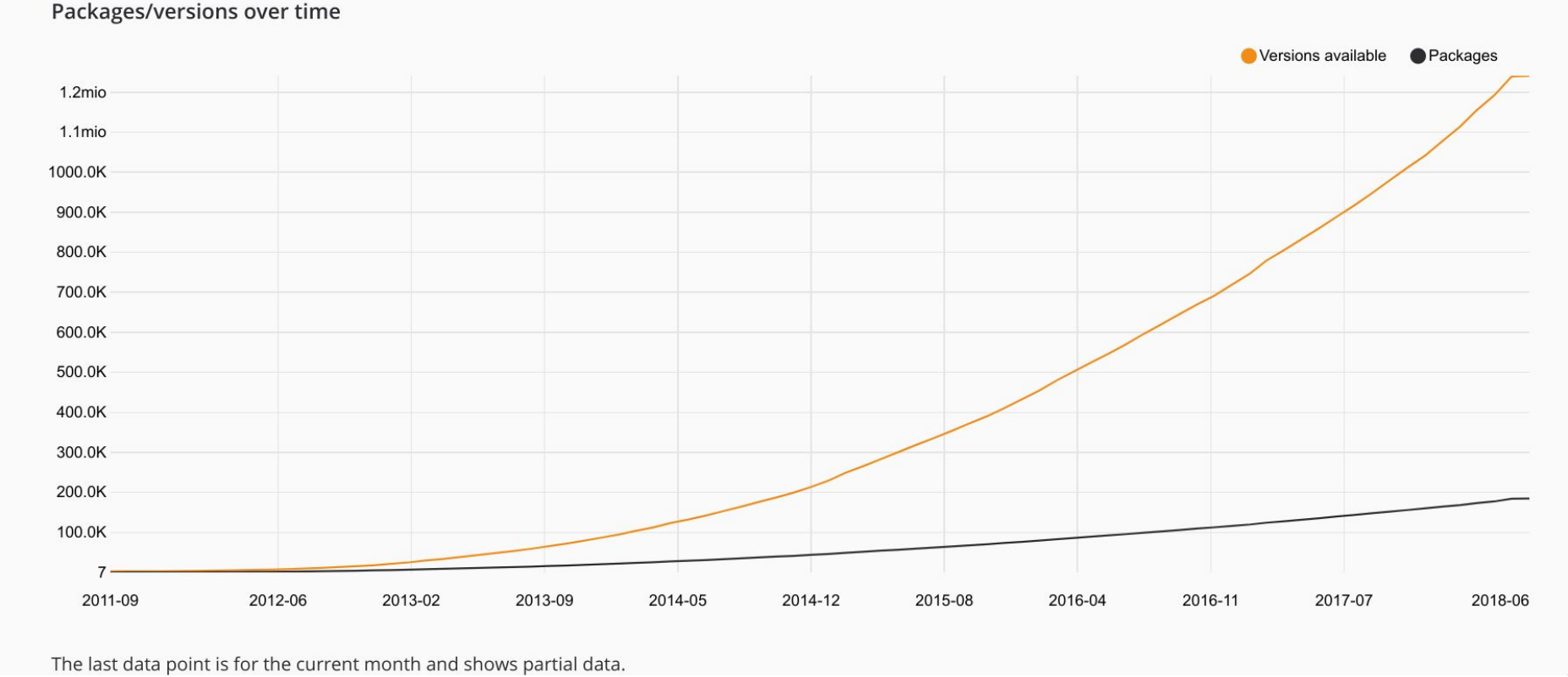
2018?

Delete your lock files

2018?

~~Delete your lock files~~

# Composer Ecosystem Reality Update 2018



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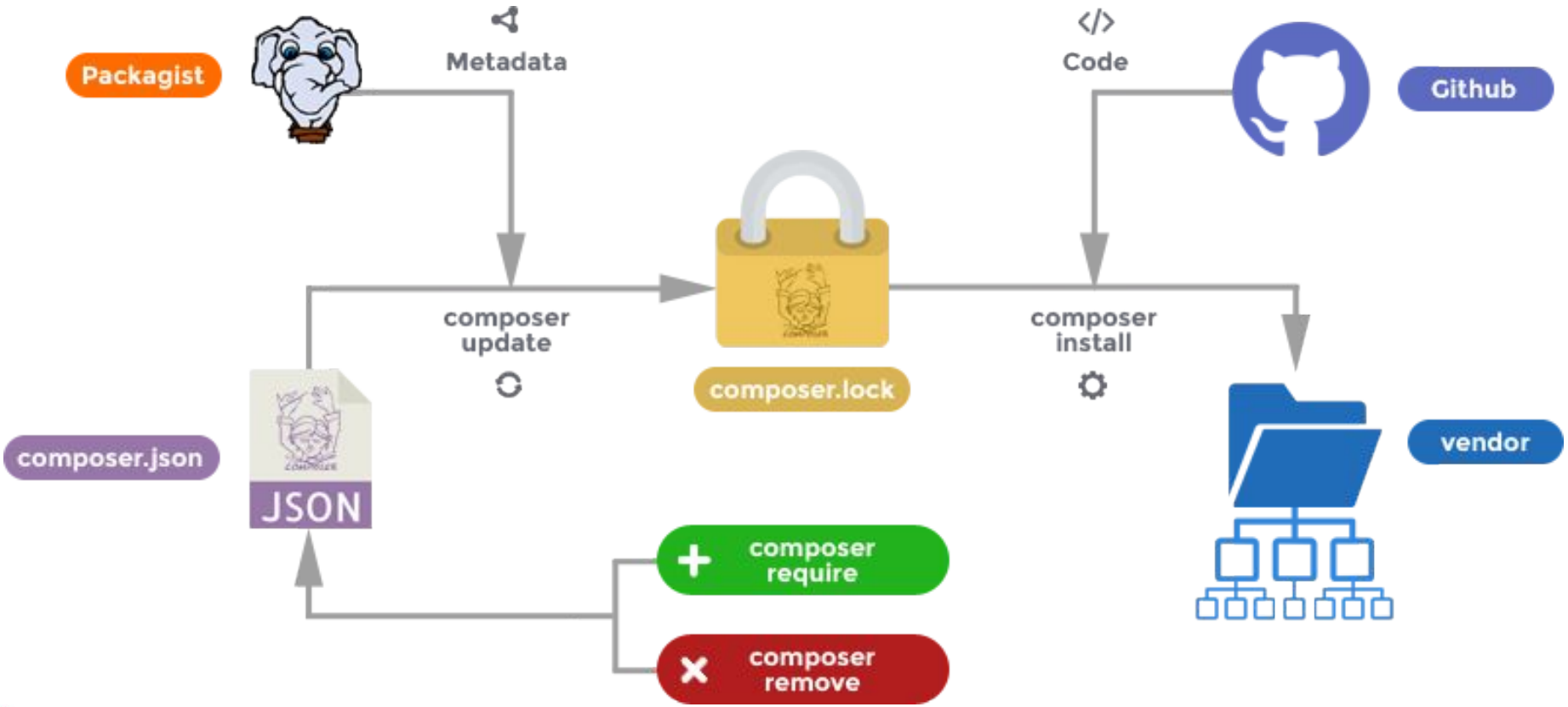
# Best Practices?



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# Deployment

# Improving your deployment process

- Slow Deployment
  - You will not enjoy deploying
- Unreliable deployment
  - You will be scared to deploy
- You deploy infrequently
  - more work to debug older problems
  - no incentive to improve the process
- Vicious cycle
  - **Reliability and speed** are key to breaking it



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# Reduce dependence on external services

- Build Process (move more into this)
  - Install dependencies (Composer, npm, …)
  - Generate assets (Javascript, CSS, generated PHP code, …)
  - Create an artifact with everything in it
- Deploy 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



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# Never Deploy without a Lock File

Do not run composer update during deployments

# 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



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# composer install performance

- Use `--prefer-dist` to avoid git clones
  - Will always download zip files if possible (default for stable versions)
- Store ~/.composer/cache between builds
  - How depends on CI product/setup you use



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# 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



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# Autoloader Optimization

- *Use this one*
  **`composer dump-autoload --optimize --classmap-authoritative`**

- Requires PHP7 to be optimal
  - opcache can keep static array definition in shared memory
  - no loading overhead on PHP request startup
- Will not search for classes not in lookup table
  - not useful for development
  - not useful for dynamically generated code (don’t do that!)



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# It’s 2018 - What’s new in Composer?

- Current version: 1.6.5 (released May 4, 2018)
  - 22 releases since January 2017

- Bugfixes & Performance Improvements
  - Over 900 issues closed since January 2017 (~250 open)
  - Over 300 pull requests closed since January 2017 (~25 open)
    - Not all bug reports / bugfixes, feature requests, support issues, etc.



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# It’s 2018 - What’s new in Composer?

- Interoperability
  - GitLab API v4
    - released in 1.5.0 in August 2017
  - Bitbucket API v2
    - released in v1.4.0 in March 2017
  - New Git versions
    - v1.4.3 in August 2017
  - Upcoming: GitHub deprecated Services
    - GitHub App for packagist.org



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# It’s 2018 - What’s new in Composer?

- New features
  - usually very small things
  - often not useful for everyone

  - Let’s look at a couple



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# New Features

**SPDX 3.0**
**License Identifier Update**

GPL2.0 => GPL2.0-only

GPL2.0+ => GPL2.0-or-later

Packagist now rejects updates with invalid license identifiers now

https://github.com/composer/spdx-licenses



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# New Features

`--with-all-dependencies`

Released in 1.6.0, Jan 2018



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# Partial Updates

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

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



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# Partial Updates

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

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



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# Partial Updates

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



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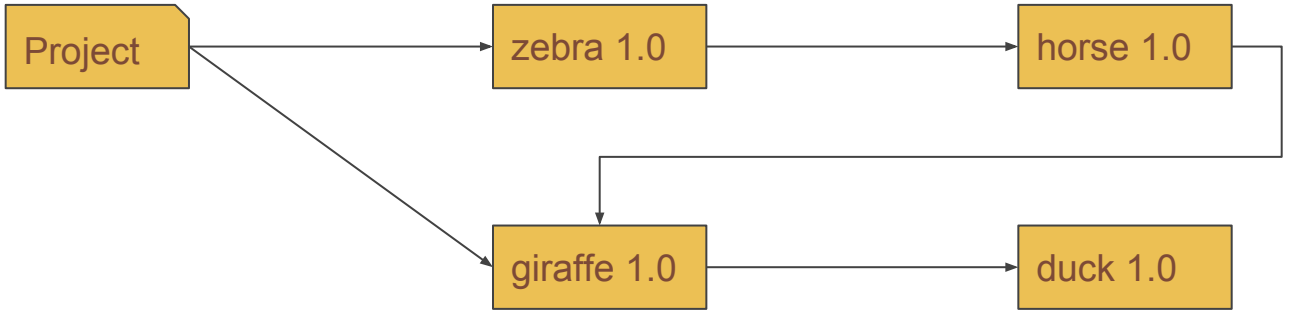
# Partial Updates




Now each package releases 1.1



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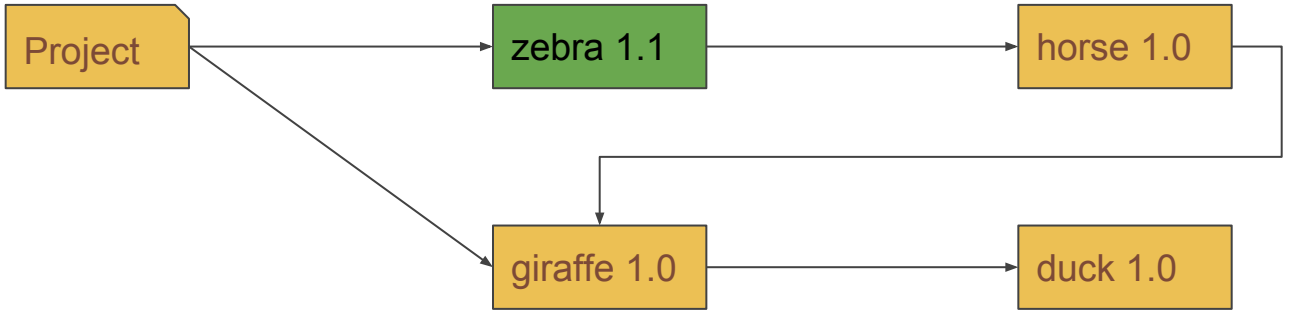
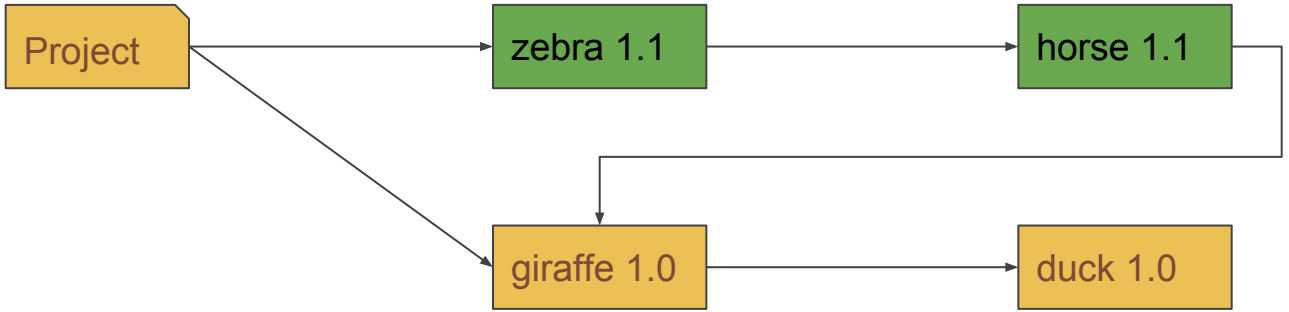
# Partial Updates




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

# Partial Updates




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



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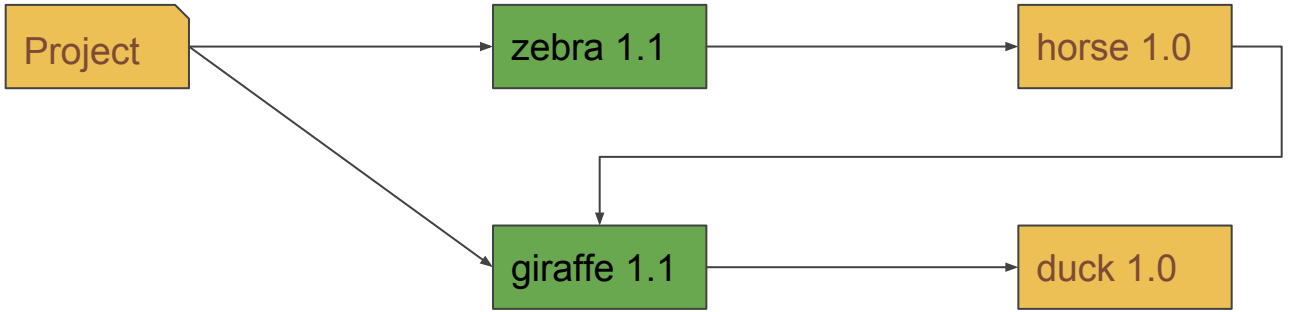
# Partial Updates




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



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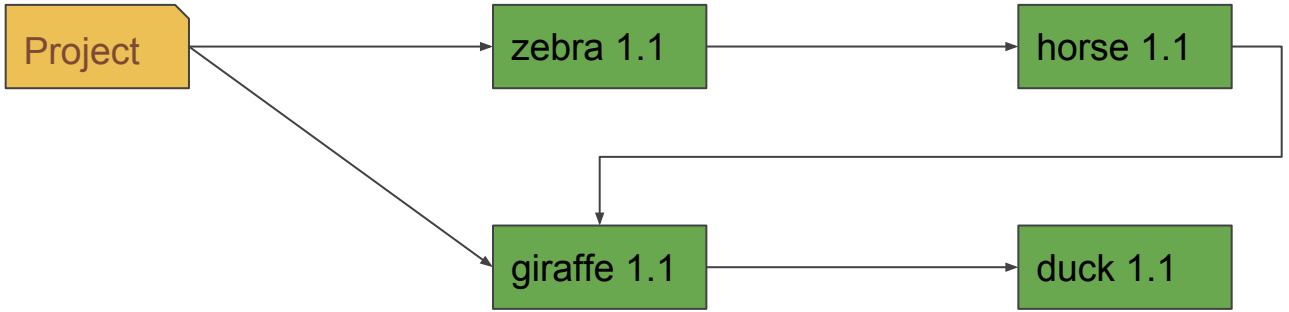
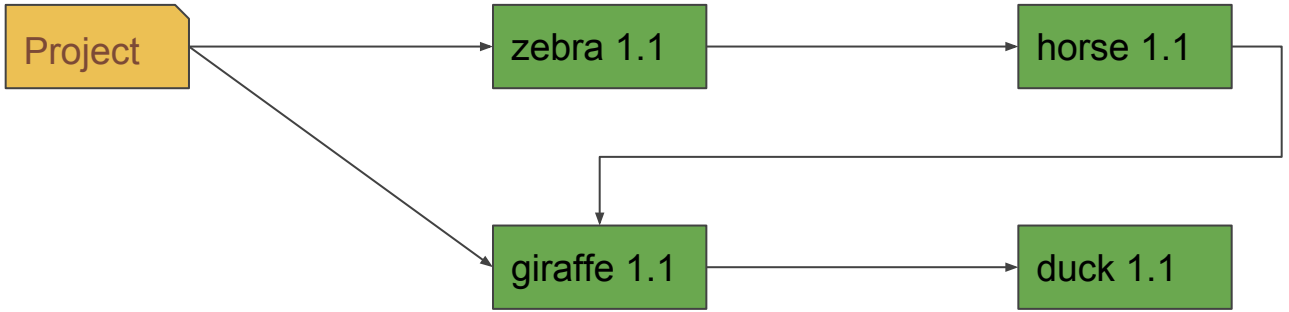
# Partial Updates




```
$ 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)
```

# Partial Updates




```
$ composer update zebra/zebra --with-all-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)
```



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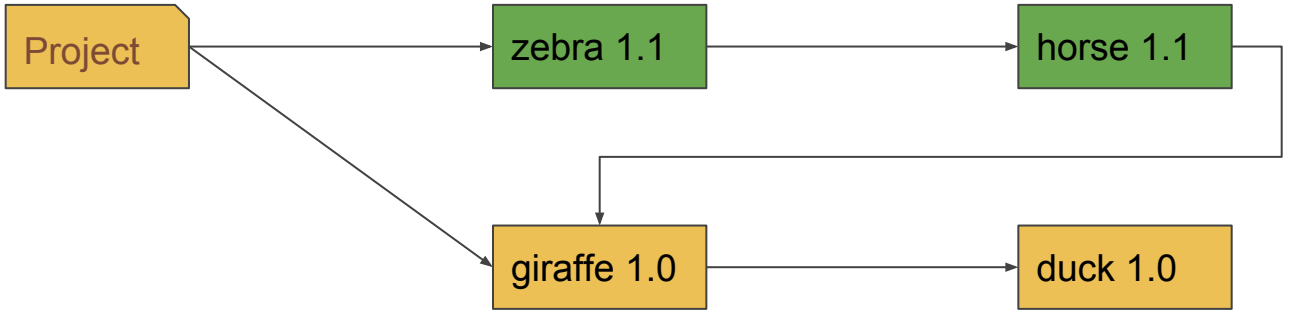
# Partial Updates




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



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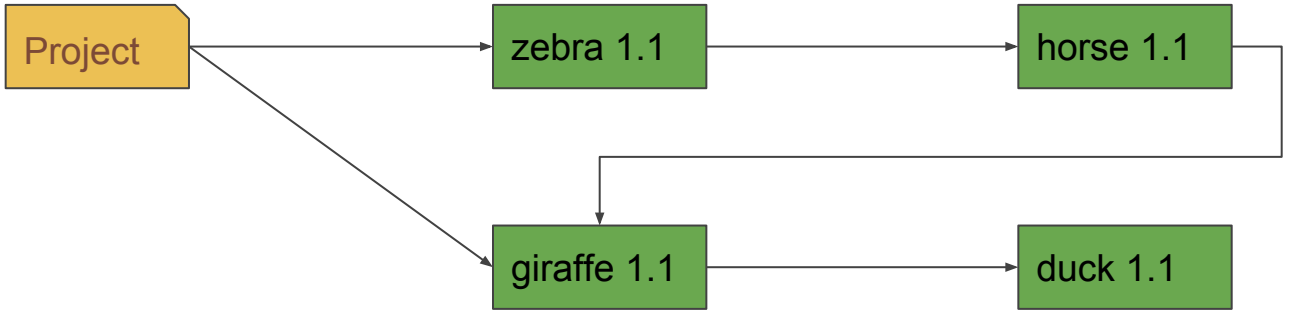
# Partial Updates




```
$ composer update zebra/zebra --with-all-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)
```



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# Best Practice: CI for Libraries

- 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`

    - Don’t use this except for testing - you’ll ruin our wonderful world where every PHP library can be installed with a plain composer install



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# Best Practice: Semantic Versioning

Promise of Compatibility

**X**.Y.Z

- Must be used consistently
  Dare to increment **X**!
- Only valuable if BC/Compatibility promise formalized
  - See http://symfony.com/doc/current/contributing/code/bc.html
  - Document in Changelog



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# Versions Constraints

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

Operatoren: “ “ AND, “||” OR



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# 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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# In case of Errors

```
$ php composer.phar validate

./composer.json is valid for simple usage with composer but has
strict errors that make it unable to be published as a package:
See https://getcomposer.org/doc/04-schema.md for details on the schema
name : The property name is required
description : The property description is required
require.composer/composer : unbound version constraints (dev-master) should be avoided
```

*Common: Version entry in composer.json conflicts with tag*

```
$ php composer.phar self-update

$ php composer.phar update -vvv
```



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# Resolution Conflicts: Overly Strict Requirements

```
// composer.json

    "require": {
        "cool/alice": "~1.3",
        "lazy/bob": "~1.2"
    }

// dependencies

    "name": "cool/alice",
    "require": {
        "monolog/monolog": "~1.6"
    }

    "name": "lazy/bob",
    "require": {
        "monolog/monolog": "1.3.*"
    }
```



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# Resolution Conflicts: Overly Strict Requirements

```
Your requirements could not be resolved to an installable set of packages.

  Problem 1
    - Installation request for lazy/bob ~1.2 -> satisfiable by lazy/bob[1.4.0].
    - Installation request for cool/alice ~1.3 -> satisfiable by cool/alice[1.3.0].
    - lazy/bob 1.4.0 requires monolog/monolog 1.3.* -> satisfiable by monolog/monolog[1.3.0, 1.3.1]
    - cool/alice 1.3.0 requires monolog/monolog ~1.6 -> satisfiable by monolog/monolog[1.6.0, 1.7.0
    - Can only install one of: monolog/monolog[1.6.0, 1.3.0].
    - Can only install one of: monolog/monolog[1.6.0, 1.3.1].
    - Conclusion: don't install monolog/monolog 1.3.1
    - Conclusion: don't install monolog/monolog 1.7.0
    - Conclusion: don't install monolog/monolog 1.3.0
    - Conclusion: don't install monolog/monolog 1.6.0
```



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# Resolution Conflicts: Overly Strict Requirements

```
// composer.json

    "require": {
        "cool/alice": "~1.3",
        "lazy/bob": "~1.2"
    }

// dependencies

    "name": "cool/alice",
    "require": {
        "monolog/monolog": "~1.6"
    }

    "name": "lazy/bob",
    "require": {
        "monolog/monolog": "1.3.*"
    }
```



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# Resolution Conflicts: Stabilities

```
// composer.json

    "minimum-stability": "beta",
    "require": {
        "monolog/monolog": "1.*",
        "symfony/symfony": "~2.4",
        "bad/package": "dev-master"
    }

// dependencies

    "name": "bad/package",
    "require": {
        "monolog/monolog": "dev-master",
    }
```



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# Resolution Conflicts: Stabilities

```
Your requirements could not be resolved to an installable set of packages.

  Problem 1
    - Installation request for bad/package dev-master -> satisfiable by bad/package[dev-master].
    - bad/package dev-master requires monolog/monolog dev-master -> no matching package found.
```



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# Resolution Conflicts: Stabilities

```
// composer.json

    "minimum-stability": "beta",
    "require": {
        "monolog/monolog": "1.*",
        "symfony/symfony": "~2.4",
        "bad/package": "dev-master"
    }

// dependencies

    "name": "bad/package",
    "require": {
        "monolog/monolog": "dev-master",
    }
```

# Resolution Conflicts: Stabilities

```
// composer.json

    "minimum-stability": "beta",
    "require": {
        "monolog/monolog": "1.*@dev",
        "symfony/symfony": "~2.4",
        "bad/package": "dev-master"
    }

// dependencies

    "name": "bad/package",
    "require": {
        "monolog/monolog": "dev-master",
    }
```



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# Resolution Conflicts: Stabilities

```
// monolog

    "name": "monolog/monolog",
    "extra": {
        "branch-alias": {
            "dev-master": "1.12.x-dev"
        }
    }
```

```
- Installing monolog/monolog (dev-master 5ad421d)
  Cloning 5ad421d6a1d5d7066a45b617e5164d309c4e2852
```



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# Resolution Conflicts: Stabilities

```
// monolog

    "name": "monolog/monolog",
    "extra": {
        "branch-alias": {
            "dev-master": "2.0.x-dev"
        }
    }
```



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# Resolution Conflicts: Stabilities

```
Your requirements could not be resolved to an installable set of packages.

  Problem 1
    - Installation request for monolog/monolog 1.*@dev -> satisfiable by
monolog/monolog[1.12.0].
    - Installation request for bad/package dev-master -> satisfiable by bad/package[dev-master].
    - bad/package dev-master requires monolog/monolog dev-master -> satisfiable by
monolog/monolog[dev-master].
    - Can only install one of: monolog/monolog[1.12.0, dev-master].
```

We require “2.*@dev” instead

- Resolution works
- Project is probably broken:
  bad/package may not be compatible with 2.*

# No error but unexpected result?

- **`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)`



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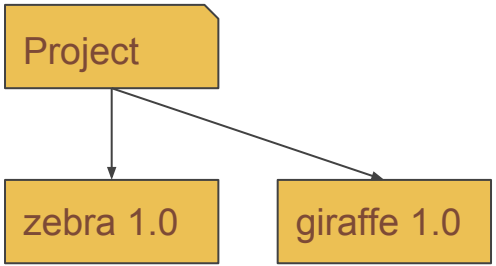
# Application/Project Versioning

- There are no other packages depending on yours?
  - **BC - for Composer consumption - doesn't matter**
- Options:
  - Don't use versions at all, rely on your VCS
  - Increment a single integer
  - Use semver if you ship the application

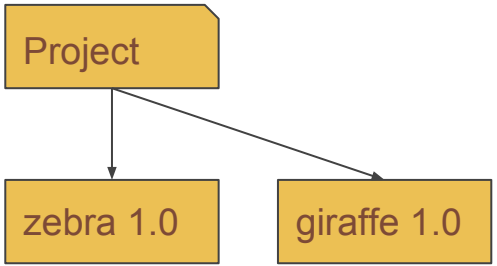
The Lock file will conflict

# Day 0: “Initial Commit”




***master***

*composer.lock*
- zebra 1.0
- giraffe 1.0




***dna-upgrade***

*composer.lock*
- zebra 1.0
- giraffe 1.0



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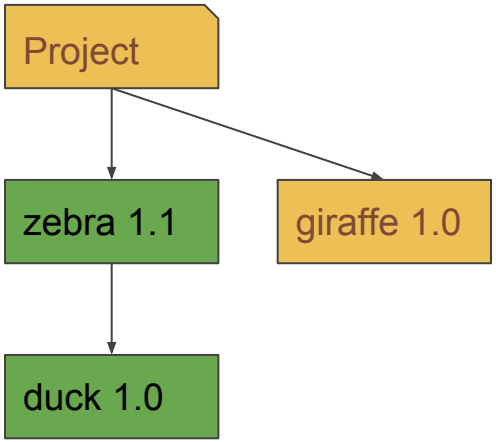
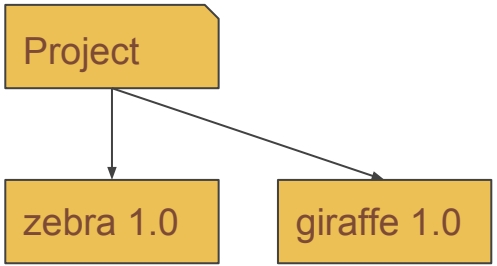
# Week 2: Strange new zebras require duck




***master***

*composer.lock*

| | |
|---|---|
| - zebra | 1.1 |
| - giraffe | 1.0 |
| - duck | 1.0 |




***dna-upgrade***

*composer.lock*

| | |
|---|---|
| - zebra | 1.0 |
| - giraffe | 1.0 |



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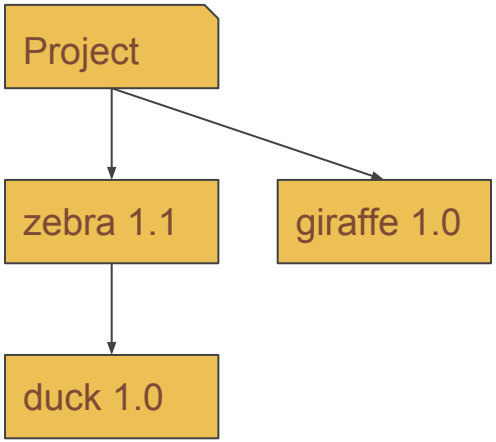
Week 3: Duck 2.0

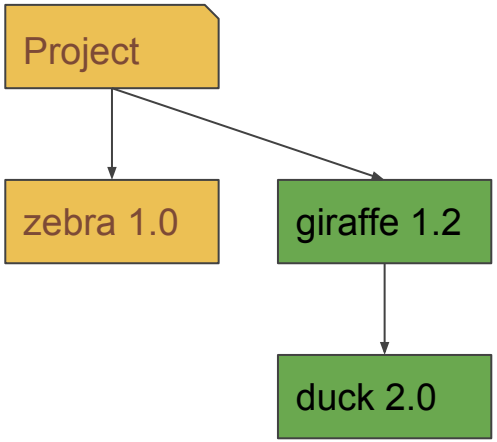
# Week 4: Giraffe evolves to require duck 2.0




***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 |



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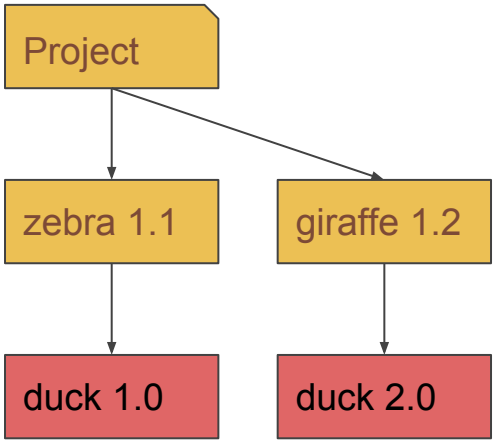
# Text-based Merge

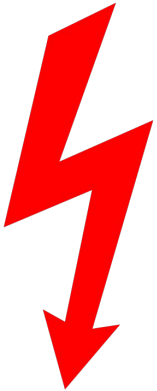



***master***

*composer.lock*

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

Merge results in invalid dependencies





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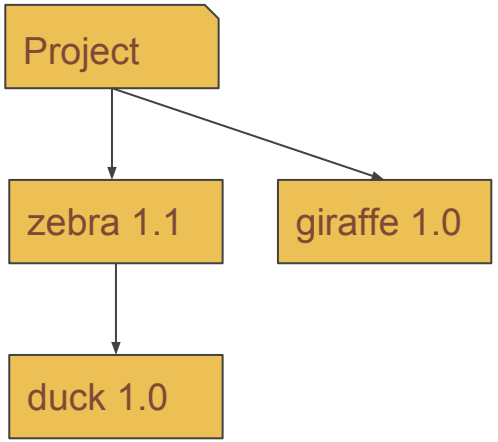
# Reset composer.lock

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




***dna-upgrade***

*composer.lock*

| | |
|---|---|
| - zebra | 1.1 |
| - giraffe | 1.0 |
| - duck | 1.0 |



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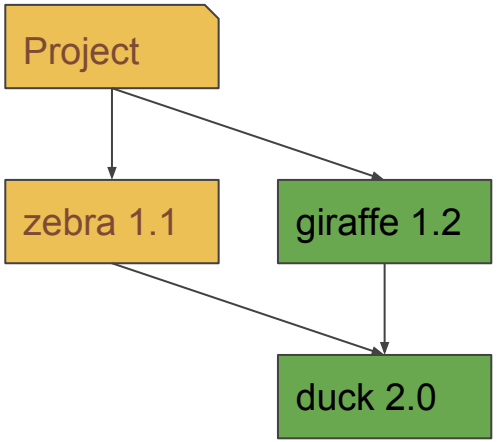
# Apply the update again

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




***master***

*composer.lock*

| | |
|---|---|
| - zebra | 1.1 |
| - giraffe | 1.2 |
| - duck | 2.0 |



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# How to resolve 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`

- Reapply changes
  - `composer update <list of deps>`



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# New Features

`check-platform-reqs`

Released in 1.6.0, Jan 2018



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# Platform Requirements

- Platform repository
  - implicitly defined additional package repository
  - contains packages for
    - PHP
    - extensions
    - system libraries (e.g. libxml)
  - packages cannot be updated/installed/removed



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# Platform Requirements

```
$ ./composer.phar show --platform

composer-plugin-api 1.1.0    The Composer Plugin API
ext-apcu            5.1.8    The apcu PHP extension
ext-ctype           7.2.5    The ctype PHP extension
ext-curl            7.2.5    The curl PHP extension
ext-date            7.2.5    The date PHP extension
ext-dom             20031129 The dom PHP extension
ext-fileinfo        1.0.5    The fileinfo PHP extension
ext-filter          7.2.5    The filter PHP extension
ext-ftp             7.2.5    The ftp PHP extension
ext-hash            1.0      The hash PHP extension
ext-iconv           7.2.5    The iconv PHP extension
ext-intl            1.1.0    The intl PHP extension
ext-json            1.6.0    The json PHP extension
ext-libxml          7.2.5    The libxml PHP extension
...
lib-curl            7.59.0   The curl PHP library
lib-ICU             58.2     The intl PHP library
lib-libxml          2.9.5    The libxml PHP library
lib-openssl         2.5.5    LibreSSL 2.5.5
lib-pcre            8.41     The pcre PHP library
php                 7.2.5    The PHP interpreter
php-64bit           7.2.5    The PHP interpreter, 64bit
php-ipv6            7.2.5    The PHP interpreter, with IPv6 support
```



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# Platform Requirements

```
{
    “require”: {
        “php”: “^7.1.1”
    }
}
```

```
$ php -v
PHP 5.6.10

$ composer update
```

Your requirements could not be resolved to an installable set of packages.

```
Problem 1
  - This package requires php ^7.1.1 but your PHP version (5.6.10) does not satisfy that requirement.
```



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# Platform Requirements

- What if you maintain multiple projects on your local system to be deployed to different platforms?
  - e.g. Server A running PHP 7.0, Server B running PHP 7.2
- What if you want to build Composer automation tools
  - Private Packagist at packagist.com runs on a single PHP version, managed projects have lots of different requirements



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# Platform Requirements

```
{
    “require”: {
        “php”: “^7.1.1”
    }
}
```

```
$ php -v
PHP 5.6.10

$ composer update --ignore-platform-reqs
Success
```

No idea if dependencies even work on PHP 7.1.1

# Platform Requirements

```
“require”: {
    “php”:“^7.1.1”,
    “ext-intl”: “*”
}
“config”: {“platform”:{
    “php”: “7.1.2”,
    “ext-intl”: “1.1.0”

}}
```

```
$ php -v
PHP 5.6.10

$ composer update
Success
```

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# Platform Requirements

- Watch out if you are using Plugins!
  - Composer plugins (Composer installers are plugins, too)
    - Packages with type “composer-plugin”
    - Will be installed before all other packages if dependencies allow it
    - Code will be executed in Composer process during update/install
  - Can be disabled with **--no-plugins**
  - no easy way to run them on prod later
- Watch out if you are using scripts
  - Use **--no-scripts**
  - Run them separately in production with **composer run-script <name>**

# Platform Requirements

```
“require”: {
    “php”:“^7.1.1”,
    “ext-intl”: “*”
}
“config”: {“platform”:{
    “php”: “7.1.2”,
    “ext-intl”: “1.1.0”

}}
```

```
$ composer update
```

Success

- Create ZIP
- deploy to prod

**PHP Fatal Error**

Prod was actually still on PHP 5.6



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# Platform Requirements

```
“require”: {
    “php”:“^7.1.1”,
    “ext-intl”: “*”
}
“config”: {“platform”:{
    “php”: “7.1.2”,
    “ext-intl”: “1.1.0”

}}
```

- dev$ composer update
- Create ZIP
- upload to prod
- **composer check-platform-reqs**
  - no error? switch to new code

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# Summary

- composer show --platform
  {“config”:{“platform”:{“php”:”7.2.5”}}}
  composer check-platform-reqs
  Watch out for plugins & scripts!
- composer install --prefer-dist
- Create a build artifact and do as little work in prod as possible
- composer dump-autoload --optimize --classmap-authoritative
- Update your license identifiers to SPDX 3.0
- SemVer: Don’t be afraid to increase the major version
- Library CI: composer update --prefer-lowest --prefer-stable
- composer update <package> --with-all-dependencies
- git checkout <branch> -- composer.lock && repeat composer update



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# Thank you!
# Questions / Feedback?

https://joind.in/talk/fee50

https://packagist.com

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