Making cabal-install non-destructive

Philipp Schuster, Andres Löh

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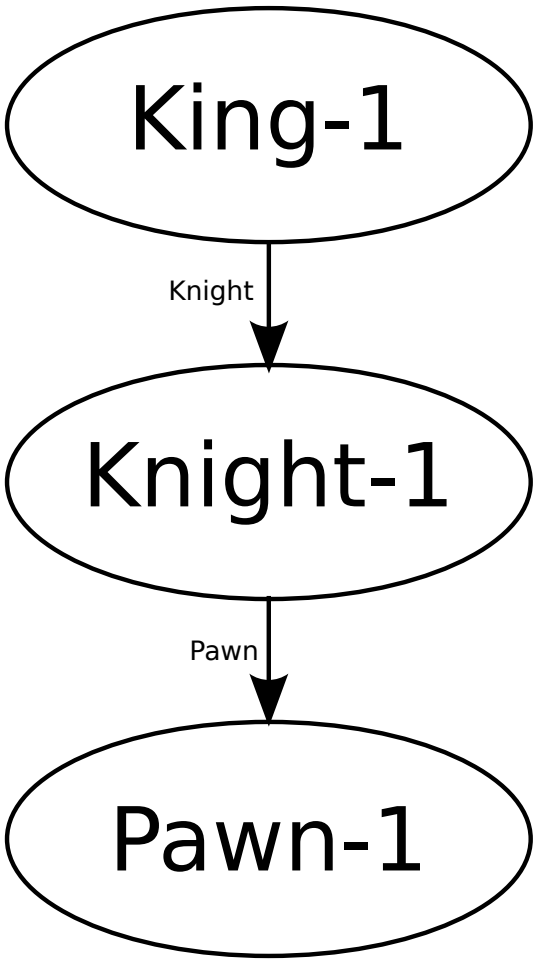
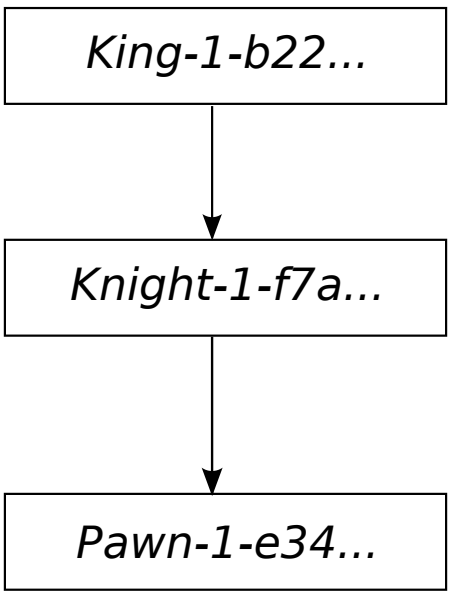
Introduction

- My name is Philipp Schuster.
- I participated in Google Summer of Code 2012.
- My supervisor was Andres Löh.
- We wanted multiple instances of the same package version installed.
- Quite a few problems remain therefore nothing is merged yet.

Example Packages



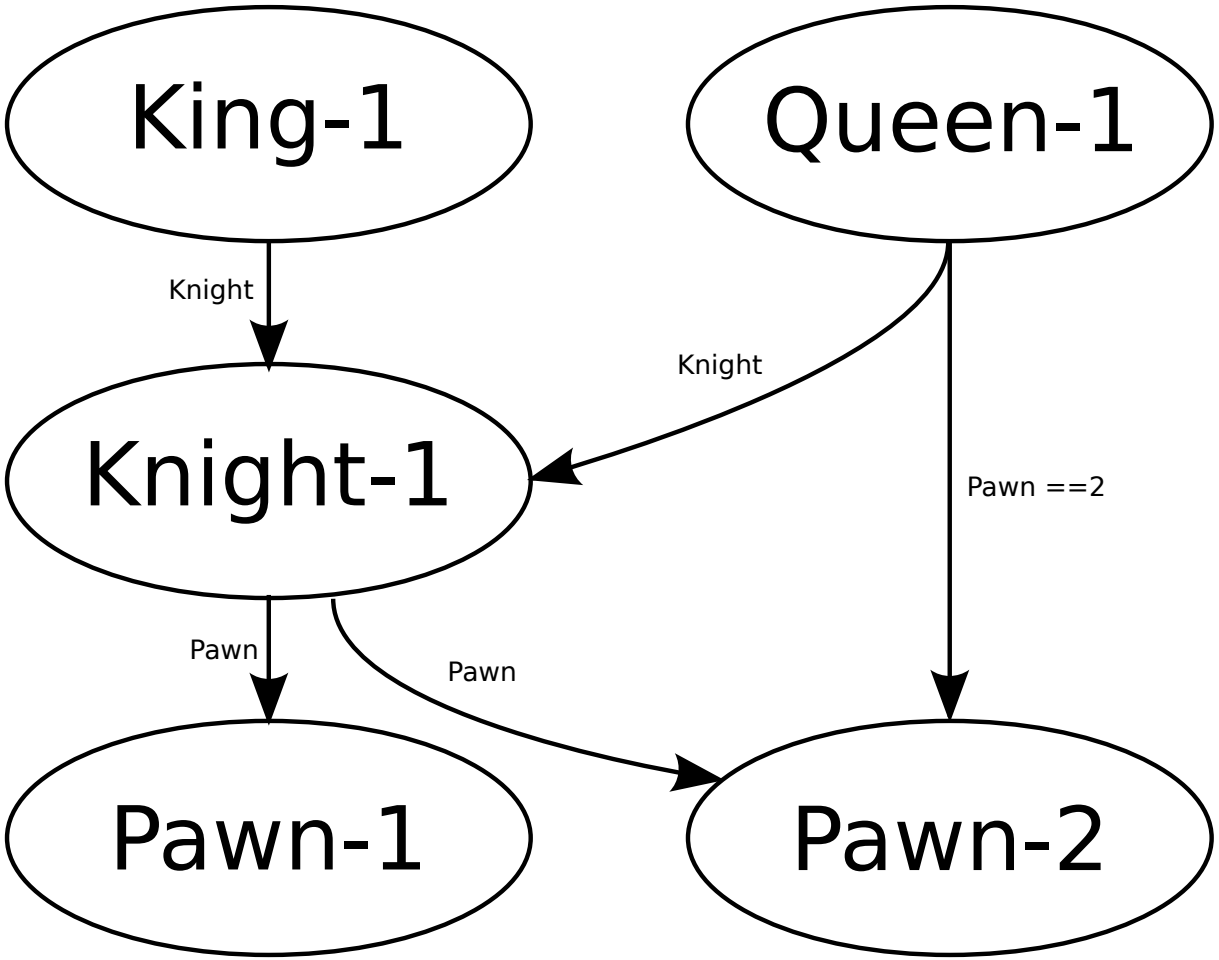
Example Instances



Listing the installed instances

```
$ ghc-pkg list --user -v
using cache: /home/pschuster/.ghc/i386-linux-7.6.0.20120815/package.conf.d/package.cache
using cache: /usr/local/lib/ghc-7.6.0.20120815/package.conf.d/package.cache
/home/pschuster/.ghc/i386-linux-7.6.0.20120815/package.conf.d
   King-1 (King-1-165729ba77dabd7b827de2e721291b61-1020960593)
   Knight-1 (Knight-1-d1e1f57c04f2a3f462eec2ee364c4dbe-1040356745)
   Pawn-1 (Pawn-1-7a9672f4fce029cc4d72cc5957d45134-1022359486)
```

Queen-1 and Pawn-2 are added

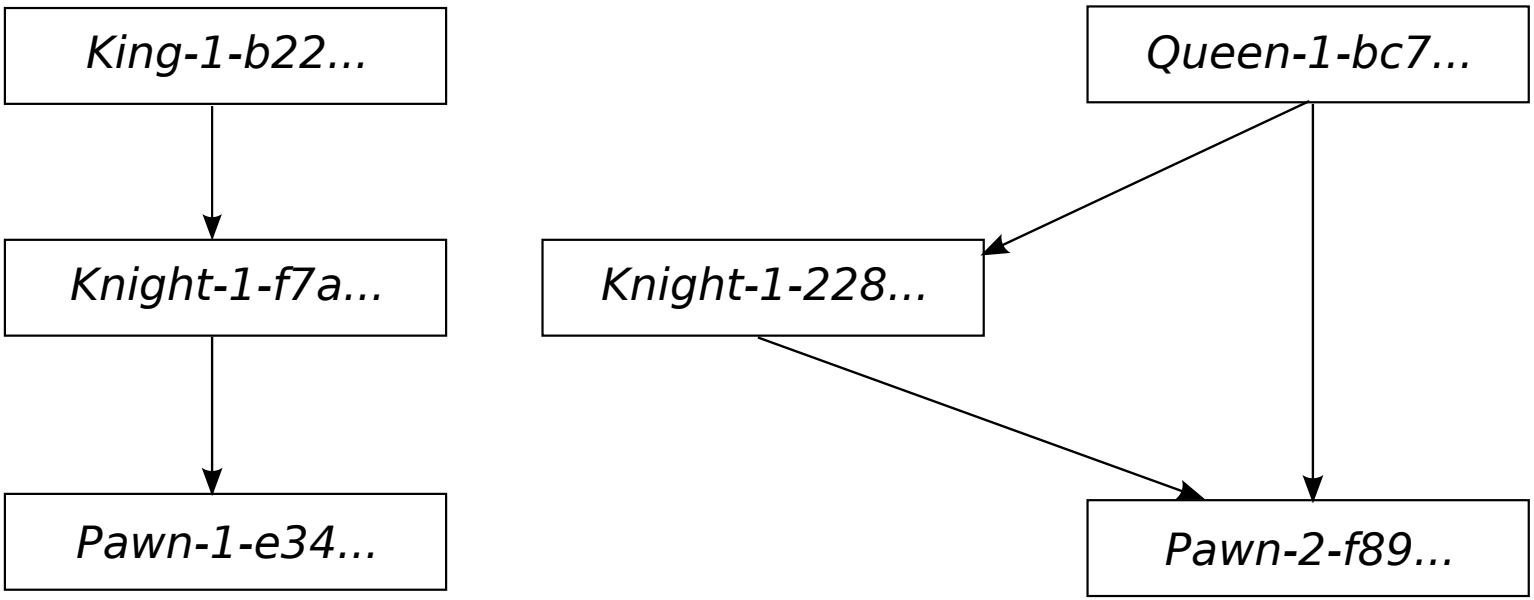


Instances with Pawn-2 installed

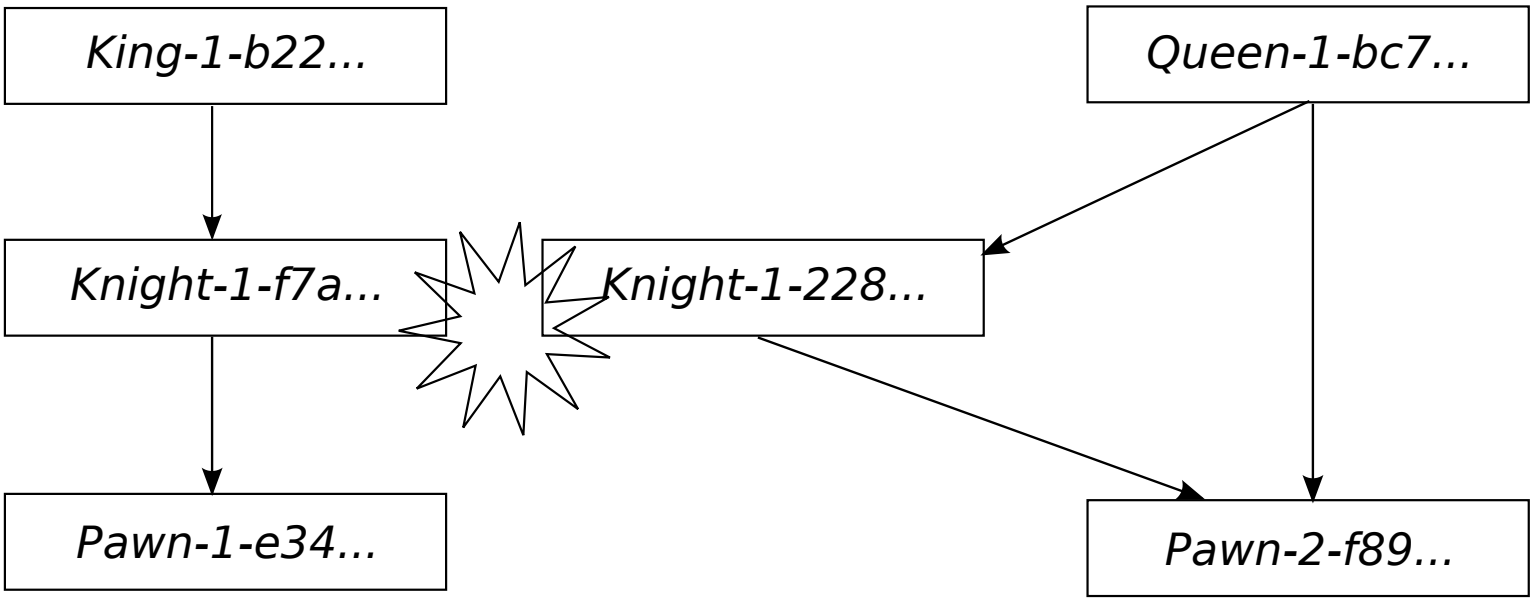
Install Pawn-2

```
$ cd Pawn
$ cabal install
Resolving dependencies...
Configuring Pawn-2...
Building Pawn-2...
Preprocessing library Pawn-2...
[1 of 1] Compiling Pawn             ( Pawn.hs, dist/build/Pawn.o )
In-place registering Pawn-2...
Installing library in /home/pschuster/.cabal/lib/Pawn-2-1181001620
Registering Pawn-2...
Installed Pawn-2
```

Instances with Queen installed



There used to be a conflict



Trying to install another Knight

```
$ cd ../Knight
$ cabal install
Resolving dependencies...
In order, the following would be installed:
Knight-1 (reinstall) changes: Pawn-1 -> 2
cabal: The following packages are likely to be broken by the reinstalls:
King-1
Use --force-reinstalls if you want to install anyway.
```

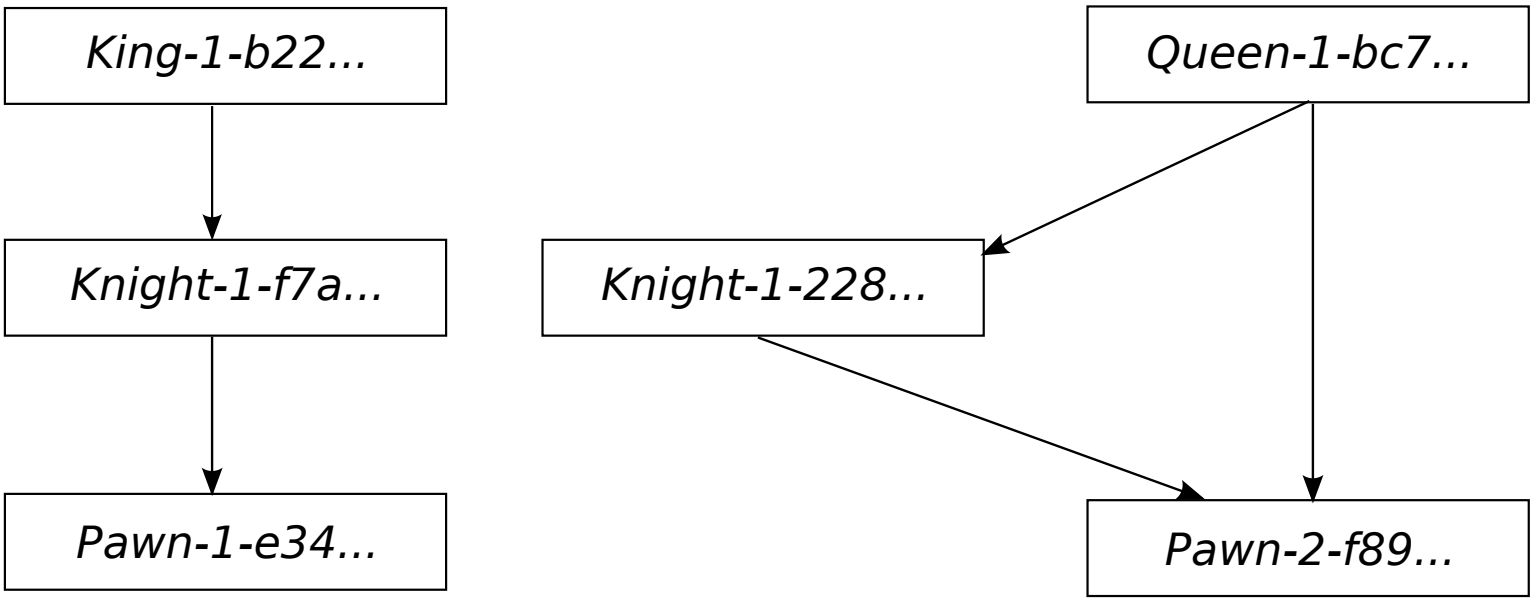
Forcing to install another Knight

```
$ cabal install --force-reinstalls
Resolving dependencies...
Warning: The following packages are likely to be broken by the reinstalls:
King-1
Continuing even though the plan contains dangerous reinstalls.
Configuring Knight-1...
Building Knight-1...
Preprocessing library Knight-1...
[1 of 1] Compiling Knight           ( Knight.hs, dist/build/Knight.o ) [Pawn changed]
In-place registering Knight-1...
Installing library in /home/pschuster/.cabal/lib/Knight-1-1213798927
Registering Knight-1...
Installed Knight-1
```

Knight got installed in a different location

```
$ ghc-pkg field Knight id,library-dirs
id: Knight-1-2a238a015dfde8866586869fc773edcf-1213798927
library-dirs: /home/pschuster/.cabal/lib/Knight-1-1213798927
id: Knight-1-d1e1f57c04f2a3f462eec2ee364c4dbe-1040356745
library-dirs: /home/pschuster/.cabal/lib/Knight-1-1040356745
```

Instances with Queen installed



Both instances of Knight are there

```
$ ghc-pkg field Knight id,depends
id: Knight-1-2a238a015dfde8866586869fc773edcf-1213798927
depends: base-4.6.0.0-188a8a5ba06e0bf0503ba32ec2568ac7
         Pawn-2-824eda7296a96dd8a5eb9c8cbf3e2f24-1181001620
id: Knight-1-d1e1f57c04f2a3f462eec2ee364c4dbe-1040356745
depends: base-4.6.0.0-188a8a5ba06e0bf0503ba32ec2568ac7
         Pawn-1-7a9672f4fce029cc4d72cc5957d45134-1022359486
```

Installing another King

```
$ cd ../King
$ cabal install
Resolving dependencies...
In order, the following will be installed:
King-1 (reinstall)
Warning: Note that reinstalls are always dangerous. Continuing anyway...
Configuring King-1...
Building King-1...
Preprocessing library King-1...
[1 of 1] Compiling King             ( King.hs, dist/build/King.o ) [Knight changed]
In-place registering King-1...
Installing library in /home/pschuster/.cabal/lib/King-1-1113590318
Registering King-1...
Installed King-1
```

King depends on the new Knight instance

```
$ ghc-pkg field King id,depends
id: King-1-3ec40c2c9564c1fd109479a358a82eef-1113590318
depends: base-4.6.0.0-188a8a5ba06e0bf0503ba32ec2568ac7
         Knight-1-2a238a015dfde8866586869fc773edcf-1213798927
id: King-1-165729ba77dabd7b827de2e721291b61-1020960593
depends: base-4.6.0.0-188a8a5ba06e0bf0503ba32ec2568ac7
         Knight-1-d1e1f57c04f2a3f462eec2ee364c4dbe-1040356745
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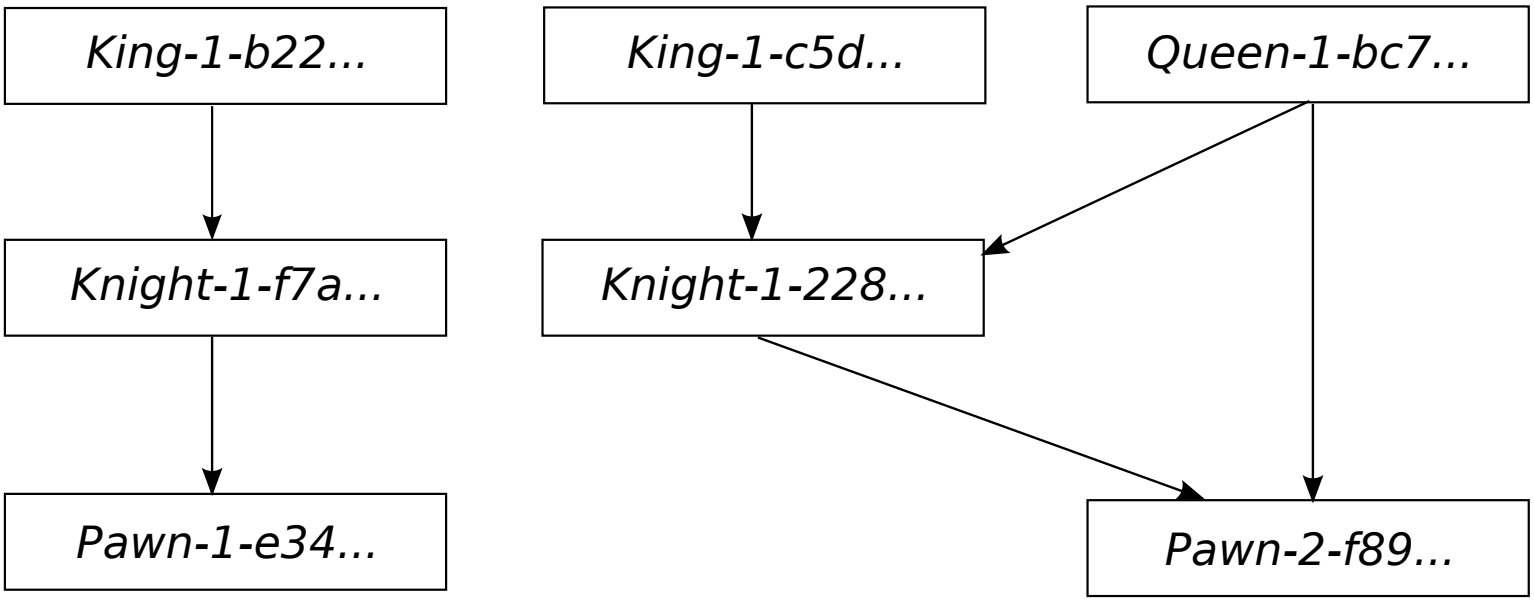
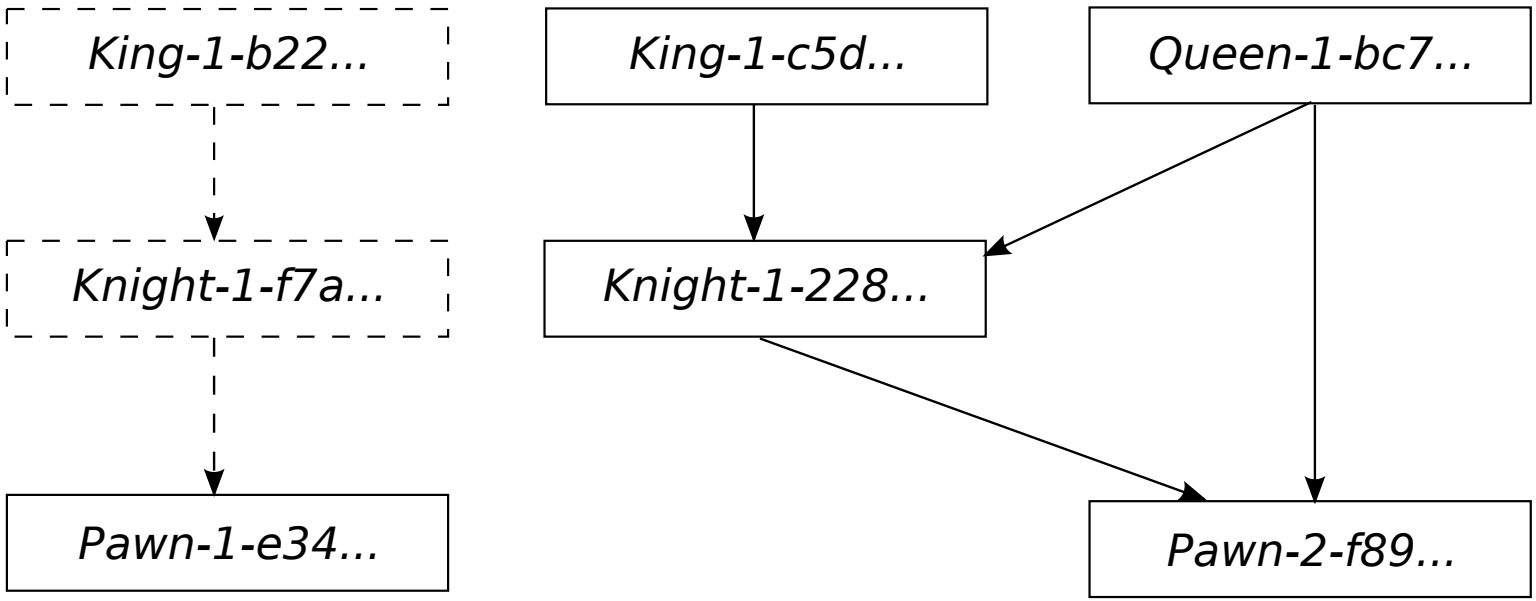
Instances with another King installed



Calling the garbage collector

```
$ cabal remove --duplicates
"Would remove King-1-165729ba77dabd7b827de2e721291b61-1020960593"
"Would remove Knight-1-d1e1f57c04f2a3f462eec2ee364c4dbe-1040356745"
```

Instances that would be garbage collected



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- Default should be $pkgid-$unique for example repa-3.1.4.2-1079787003.

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- Default $libsubdir was $pkgid/$compiler for example repa-3.1.4.2/ghc-7.4.1.
- Default should be $pkgid-$unique for example repa-3.1.4.2-1079787003.
- $unique is resolved to a big random number but only by cabal-install not by Cabal the library.

Install location cont.

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- Because of package_Paths.hs the install location has to be known at compile time.

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- cabal-install determines the random number during configuration.
- Cabal the library only appends the given String.
- InstalledPackageId can not be used as the install location because it contains the ABI hash.

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- Not sure if shadowing in GHC still works.

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- When a new package is registered ghc-pkg used to remove all other instances with the same version.
- Now ghc-pkg never removes anything when registering.
- It should probably warn when inserting a package with an existing InstalledPackageId.

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- Suggests all unnecessary packages for removal.
- A package is unnecessary if all packages that depend on it are unnecessary
- and it is not the latest instance of its version.
- It does not even unregister.

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- The original idea was to hash all build inputs (compiler, tools, source, dependencies).
- Use this "cabal-hash" to identify an instance and to detect if an instance can be reused.
- Conflating all build information into a hash has a drawback:
- Two packages might be usable together although their build inputs and therefore their hashes are not exactly the same.

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- Would not be a problem if there would only ever be one instance per build inputs per machine.
- But we have a global and a user database so there might actually be two incompatible instances with the same build inputs.

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- It has to be communicated back to cabal-install.
- The current workaround is to only specify those instances that were already installed with an InstalledPackageId.

Future work

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- Garbage collection that does something.
- Andres still wants a cabal hash.

Thank you

- Questions/Discussion