Redpill Linpro

Data Driven Cache Invalidation

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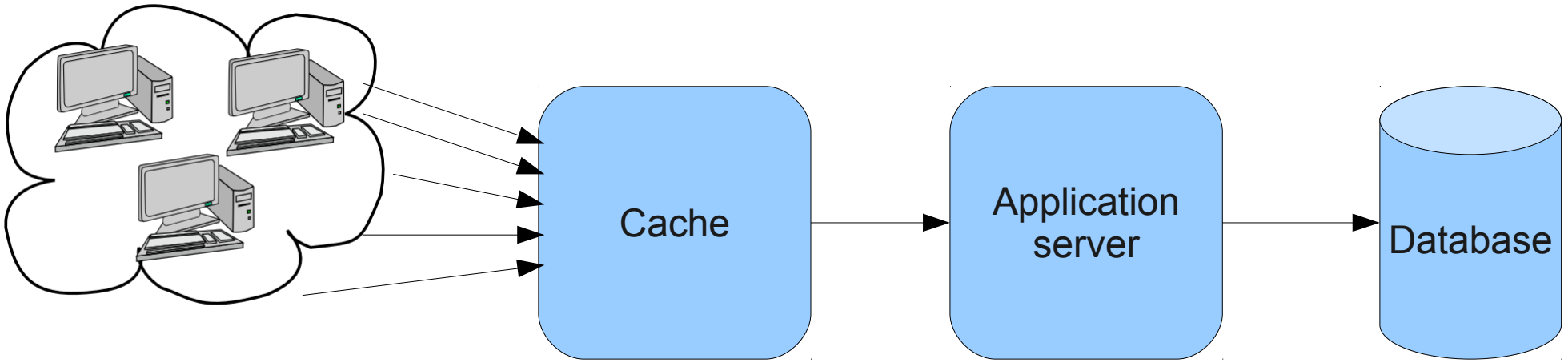
What's this all about

- We like to build advanced websites
- We want them to be popular
- Hopefully they become popular
- They fall over
  - So we add caching
  - Which adds new issues

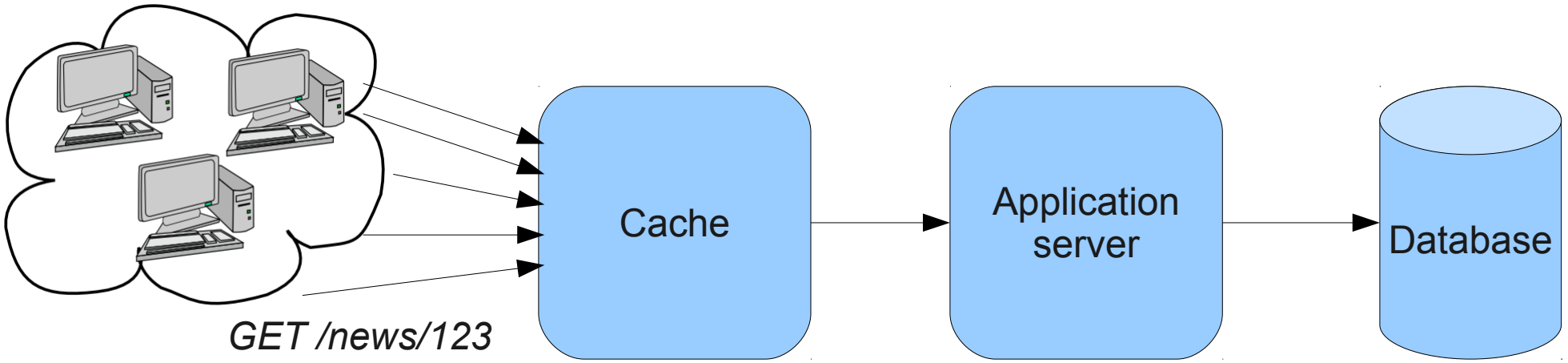
Where to cache

- Many different locations to cache:
  - In the database server (buffer cache)
  - In the database server (“query cache”)
  - In the application server
  - Before the application server (“http cache”)
  - In the client
- The closer to the client, the more efficient

Typical architecture



Typical architecture



In this presentation

- Let's build a blog!
- A really simple one!
- But we're popular! (right?)

Intro to the application

- We'll use PostgreSQL (d'uh)
- We'll use *django*
  - Theory is framework independent
  - Django-admin makes life easy...
- We'll use Varnish

Let's create the application

```
$ django-admin startproject demo
$ manage.py startapp blog
```

- Configure our database connection
- Enable the django admin site
- Add our application

Create a simple model

- We're just going to hold blog posts
- Title, date/time, and contents
- And add it to the admin site
- Sync the database

Create simple views

- One view to list all blog posts
  - Served up as /
- One view to show the posts
  - Served up as /<blog post id>/
- (let's ignore nice URLs and CSS for now)

Try it out

- Using local django web server

  ```
  $ ./manage.py runserver
  ```

- Each click causes appserver call
- Which in turn causes db query

Add varnish to the mix

- Very simple default install:
  - Relay all URLs to localhost:8000
  - Cache all pages for 1 hour
  - Ignore cookie-related issues
    - (this is not a varnish session, after all...)

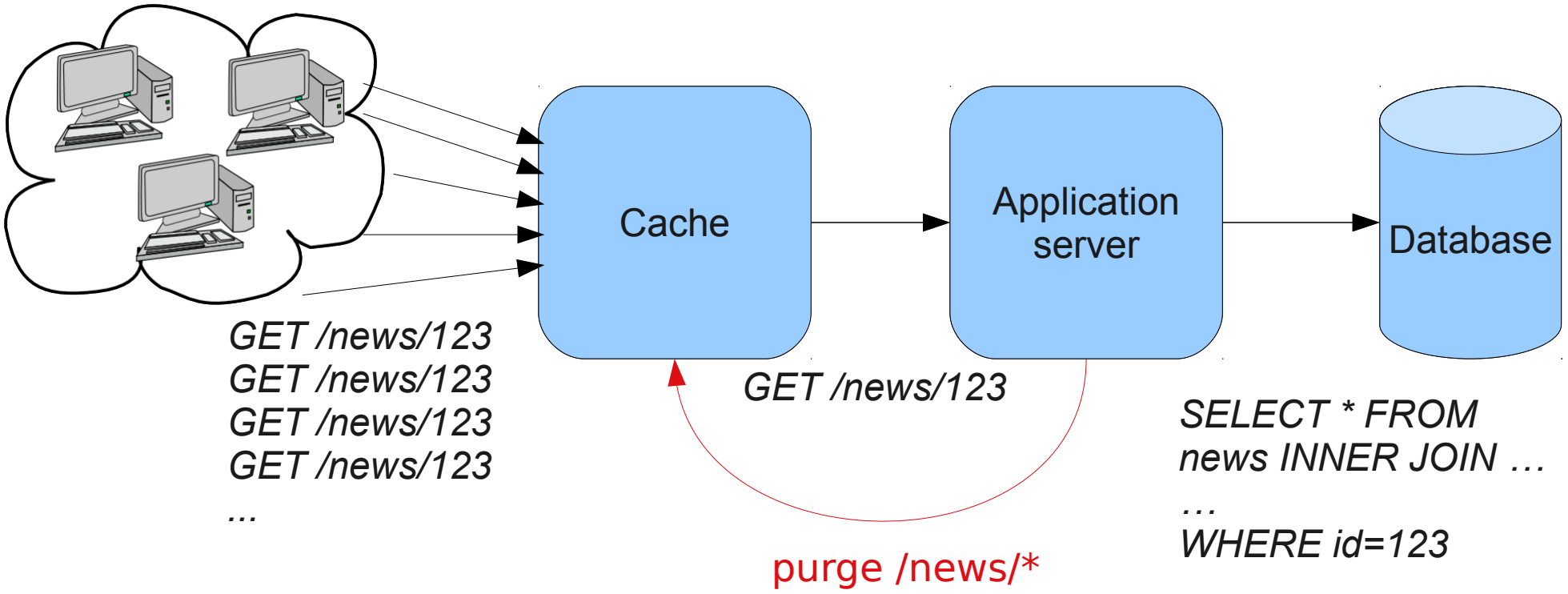
Issues with caching

- Some content rapidly go stale
  - Solution: cache only a short time!
- Some content is very long-lived
  - Solution: cache a long time!
- Sometimes unpredictable
  - Per-url or per-request cache values become sub-optimal

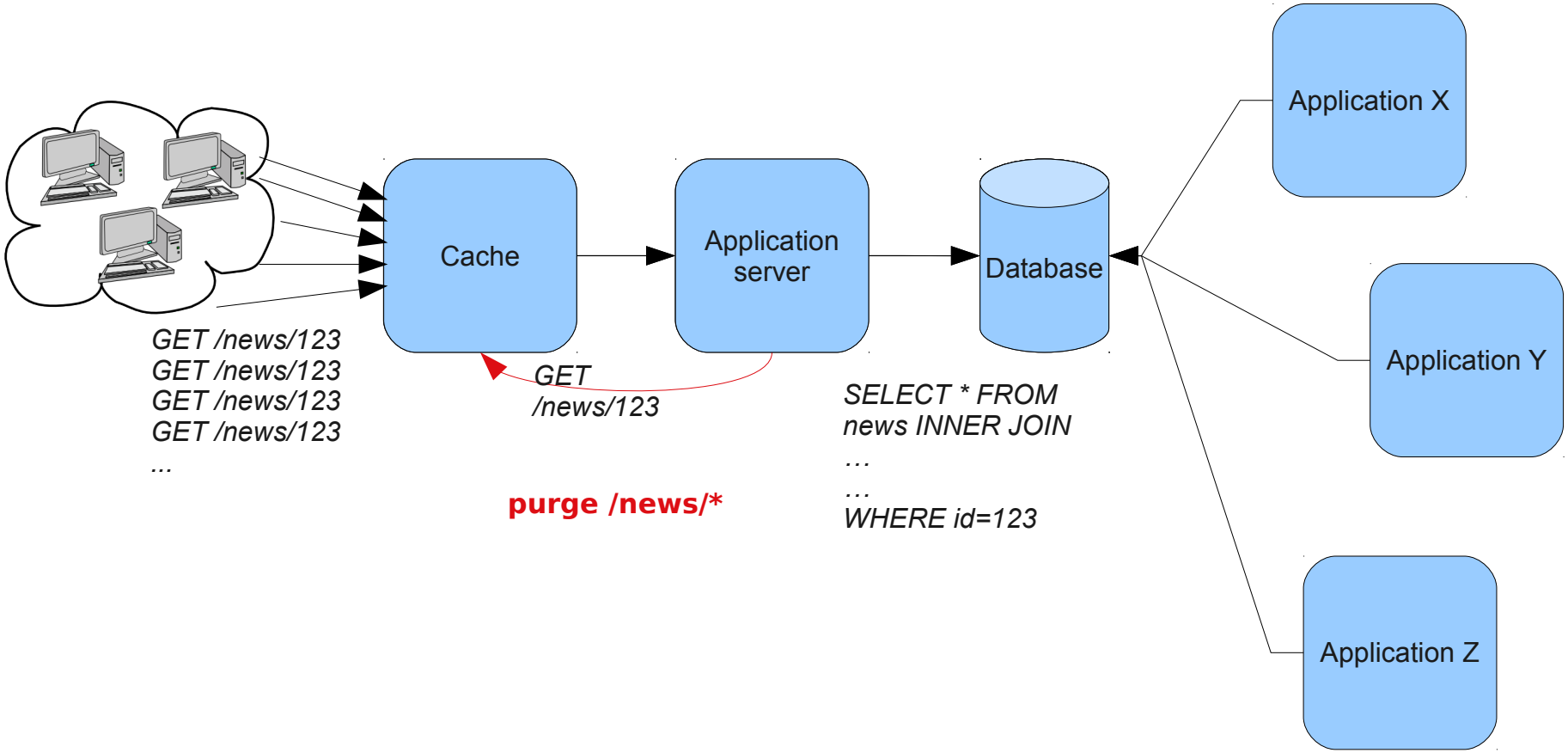
On-demand invalidation

- Cache most objects for a long time
- Explicitly remove them from the cache
  - When object modified in app
  - When dependent object modified in app
  - …

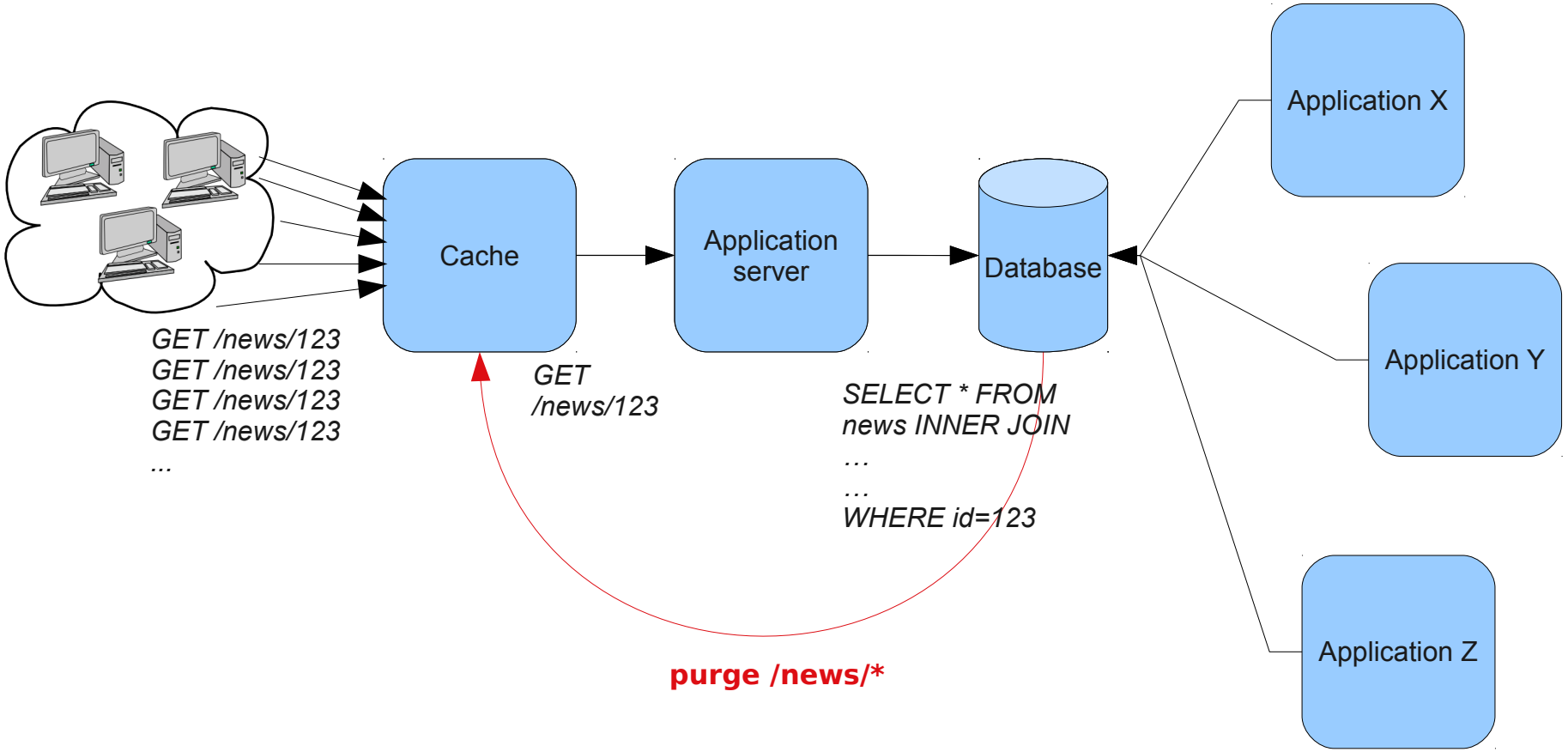
Cache invalidation



What about other apps!



Invalidate from the db!



Ups and Downs

- Upside
  - Cache invalidation when relevant *data* changes
  - Regardless of origin of change
- Downside
  - Database needs to gain URL knowledge
  - Breaks “clean abstraction model”

Invalidation: method 1

- Create a trigger on the blog_post table
- Have it send off a varnish purge request

Invalidation: method 2

- Create a trigger on the blog_post table
- Trigger inserts the request in a queue table
- Trigger on the queue table fires a NOTIFY
- Daemon listens to notifies and sends purge requests

Invalidation: method 3

- We just created a trivial queue
- There are ready-made queues out there
- Pgq!
- High performance and efficient
- Offload work of dealing with multiple caches etc

Install pgq

- Install pgq in the database
- Create our queue
- Start a “ticker” process

Write simple consumer

- Consumes events from pgq
- Generates varnish purge requests
- Run one consumer for each varnish server

Pgq hand-holding

- Needs almost nothing
- But don't forget to monitor it!
- `pgqadm.py pgq.ini status`
- Or munin plugin

Final words

- Keep setting cache expiry times
  - s-maxage etc
- Then use purging only when needed
- You don't want thousands per second

Thank you!

Questions?

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