



Symbiota2: Enabling Greater Collaboration and Flexibility in Mobilizing Biodiversity Data

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Overview of change

Symbiota

- Widely used, mostly
 - In North America
 - For plants, fungi, algae & insects
- Because
 - Multiple data input choices
 - Multiple appealing displays
 - Tools for multiple user groups
 - Collections managers
 - Systematists
 - Educators
 - Ecologists

Symbiota 2

- Symbiota plus easier to
 - Install, update, configure, maintain, improve
 - Use with intermittent internet access
 - Integrate into analytical workflows
 - Integrate with other CMS systems
 - Use with different devices
 - Locate its abilities
 - Adapt to different areas/objectives
 - Languages, alphabets, terms
 - Education, botanic gardens

This presentation

- Objectives for year 1
 - Make Symbiota2 easier to install and update
 - Modify architecture to make Symbiota2 more flexible
- Looking ahead
 - Goals - development
 - Goals - for users

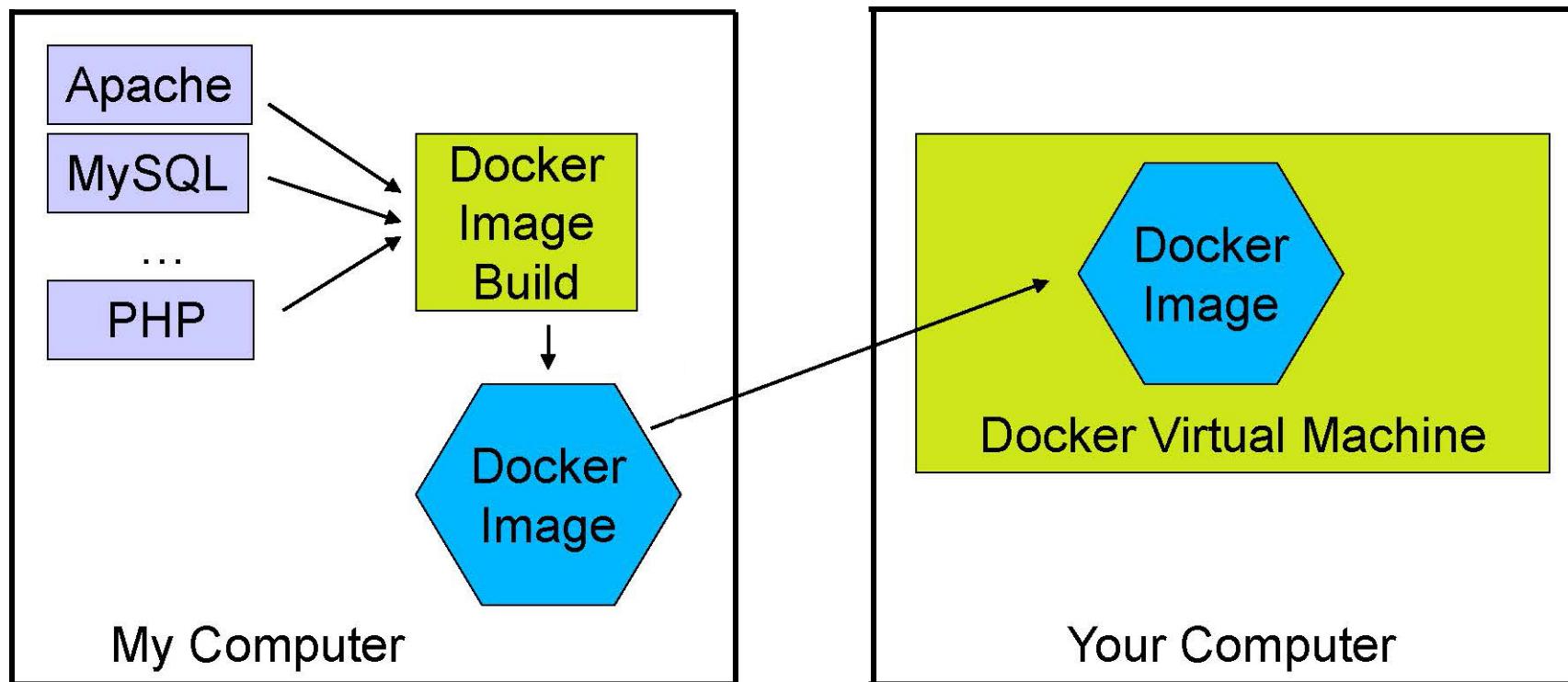
The screenshot shows the PhpStorm IDE interface. The left pane displays a project structure for a 'Core' module, which includes 'docs', 'e2e', 'node_modules library root', 'plugins' (containing 'checklist', 'collection', 'crowd-source', 'excicati', 'glossary', 'image-processor', 'key', 'media', 'occurrence', 'occurrence-association', 'occurrence-comment', 'occurrence-dataset', 'occurrence-genetic', 'occurrence-loan', 'occurrence-search', 'reference', 'symbiota-auth', 'symbiota-plugin', 'symbiota-plugin-loader', 'symbiota-shared', 'symbiota-spatial', 'taxa', 'api', and 'i18n'), and 'src' (containing 'user.models', 'user.services.ts', 'auth-data.models', 'auth.service.ts', 'Kernel.php', 'UserController.php', and 'edit-profile.component.ts'). The right pane shows the code for 'Kernel.php'. The code defines a class 'Kernel' that extends 'BaseKernel' and implements 'MicroKernelTrait'. It includes methods for getting cache and log directories, and registering bundles. The terminal window at the bottom shows Angular CLI server logs, indicating successful compilation and proxying requests to the local host.

```
<?php  
namespace Core;  
  
use ...  
  
class Kernel extends BaseKernel  
{  
    use MicroKernelTrait;  
  
    const CONFIG_EXTS = '.(php.xml,yaml,yml)';  
  
    public function getCacheDir()  
    {  
        return $this->getProjectDir().'/var/cache/'.$this->environment;  
    }  
  
    public function getLogDir()  
    {  
        return $this->getProjectDir().'/var/log';  
    }  
  
    public function registerBundles()  
    {  
        $contents = require $this->getProjectDir().'/config/bundles.php';  
        foreach ($contents as $class => $envs) {  
            if ($envs[$this->environment] ?? $envs['all'] ?? false) {  
                yield new $class();  
            }  
        }  
    }  
}  
  
chunk [scripts] scripts.js, scripts.js.map (scripts) 133 kB [entry] [rendered]  
chunk [styles] styles.js, styles.js.map (styles) 181 kB [initial] [rendered]  
chunk [vendor] vendor.js, vendor.js.map (vendor) 11.6 MB [initial] [rendered]  
** Angular Live Development Server is listening on localhost:4200, open your browser on http://localhost:4200 **  
1 'wchn': Compiled successfully.  
[HMR] GET /api/clientconfigurations -> http://localhost:4200  
[HMR] GET /api/pluginconfigurations -> http://localhost:4200  
[HMR] Error occurred while trying to proxy request /api/pluginconfigurations from localhost:4200 to http://localhost (ECONNREFUSED) (https://nodejs.org/api/errors.html#errors\_common\_system\_errors)  
[HMR] Error occurred while trying to proxy request /api/clientconfigurations from localhost:4200 to http://localhost (ECONNREFUSED) (https://nodejs.org/api/errors.html#errors\_common\_system\_errors)  
[HMR] GET /api/users/authuser -> http://localhost  
[HMR] Error occurred while trying to proxy request /api/users/authuser from localhost:4200 to http://localhost (ECONNREFUSED) (https://nodejs.org/api/errors.html#errors\_common\_system\_errors)  
118 Files Updated // View (today 12:06 PM)
```

Year 1: Primary focus re-organizing existing code.

Objective. 1: Easier Installation and configuration

- Use Docker: virtual machine, basic Linux environment
- Runs on Mac, Windows, Linux, Android (but not Windows CE, iOS)
- Containers for various software components

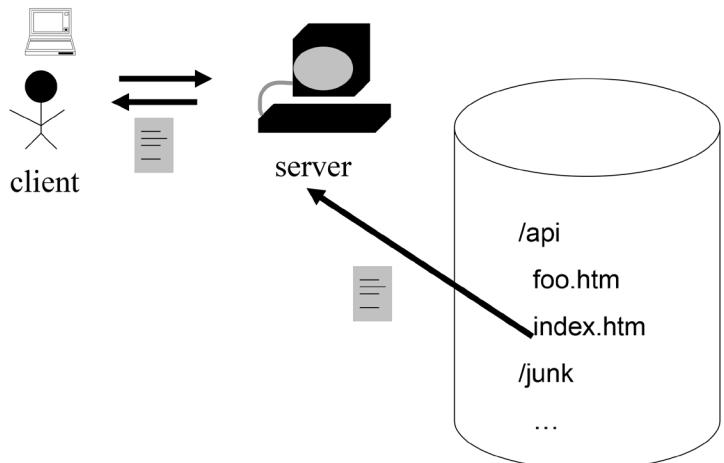


Using for development

Objective 2. Modify architecture

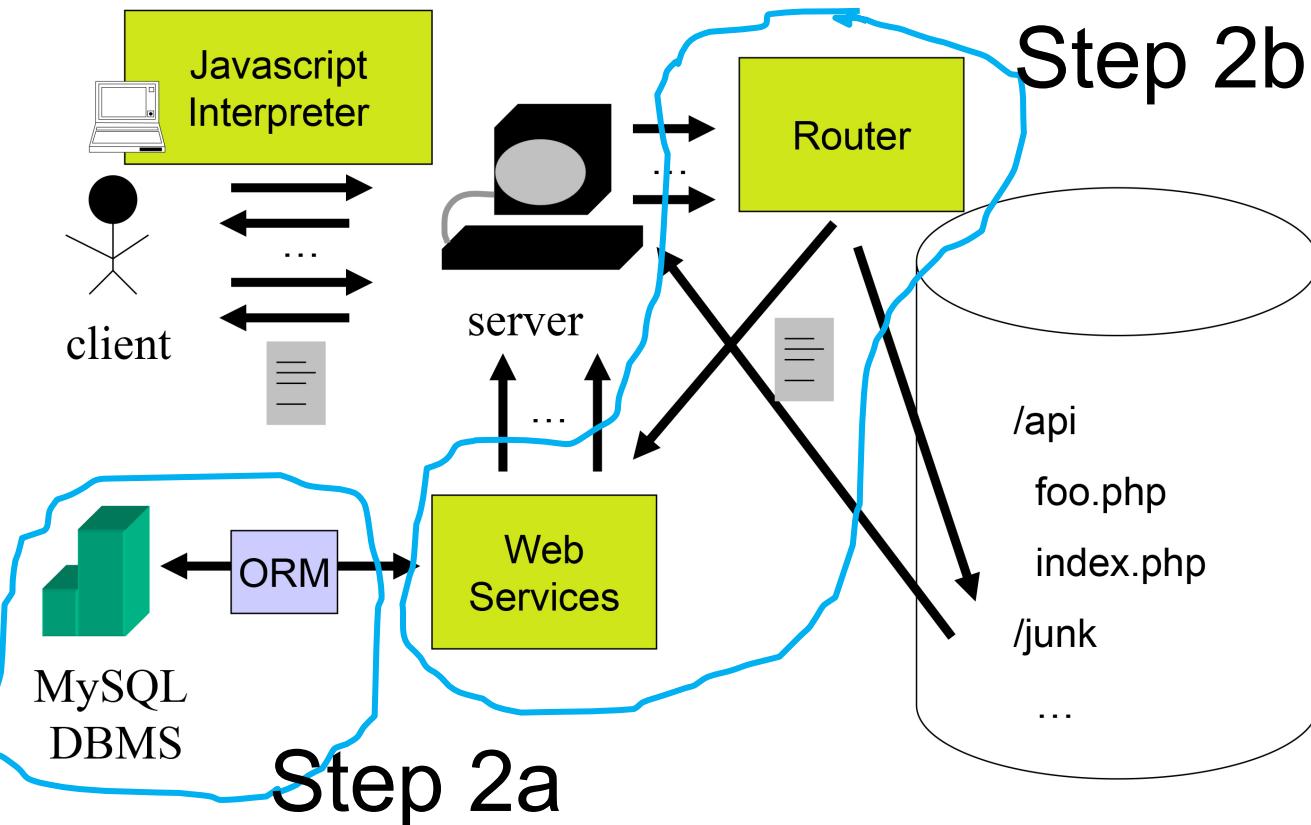
Architecture of a Web Site - 1995

GET http://smbiota2.org/api/index.htm



Architecture of a Web Site - Current

GET http://smbiota2.org/api/index



Step 1: Object-Relational Mapping (ORM)

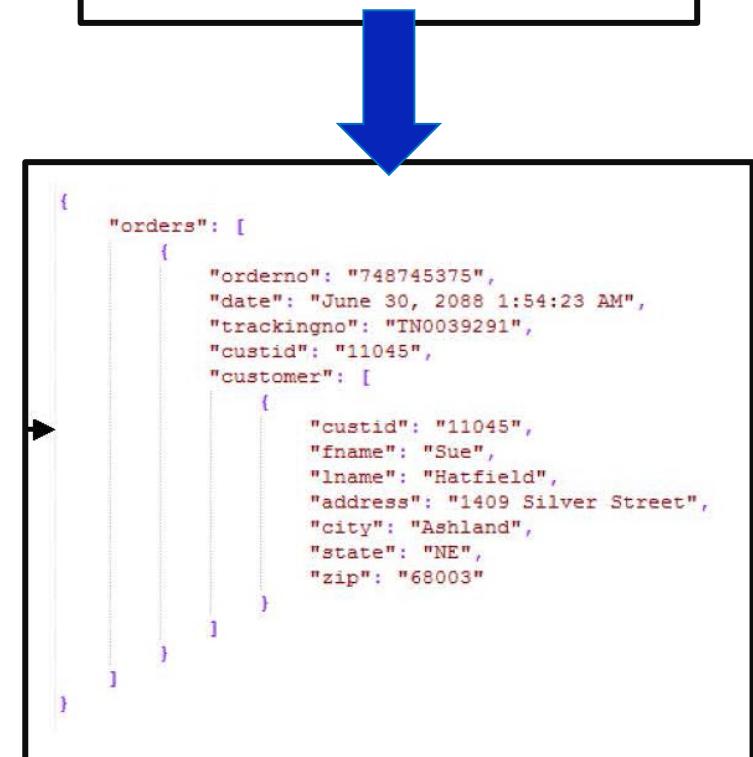
- Define schema by ORM
 - Can generate DBMS schema from ORM
 - Define new ORM mappings, create new tables in database
 - Change the ORM, changes pushed to the schema
 - Can migrate from MySQL to Postgres
- Doctrine2 provides
 - Database abstraction
 - Drivers for MySQL, Postgres, SQLite
 - Mapping of tables to objects

DONE!

Purchase table			
Transaction ID	Customer ID	Product ID	Purchase date
1112	24221	8977	03-22-2010
1113	24222	8978	03-22-2010
1114	24223	8979	03-22-2010

Customer ID	Customer	Address
24221	Bob	123 East street
24222	Alice	223 Main street
24223	Martha	455 North street

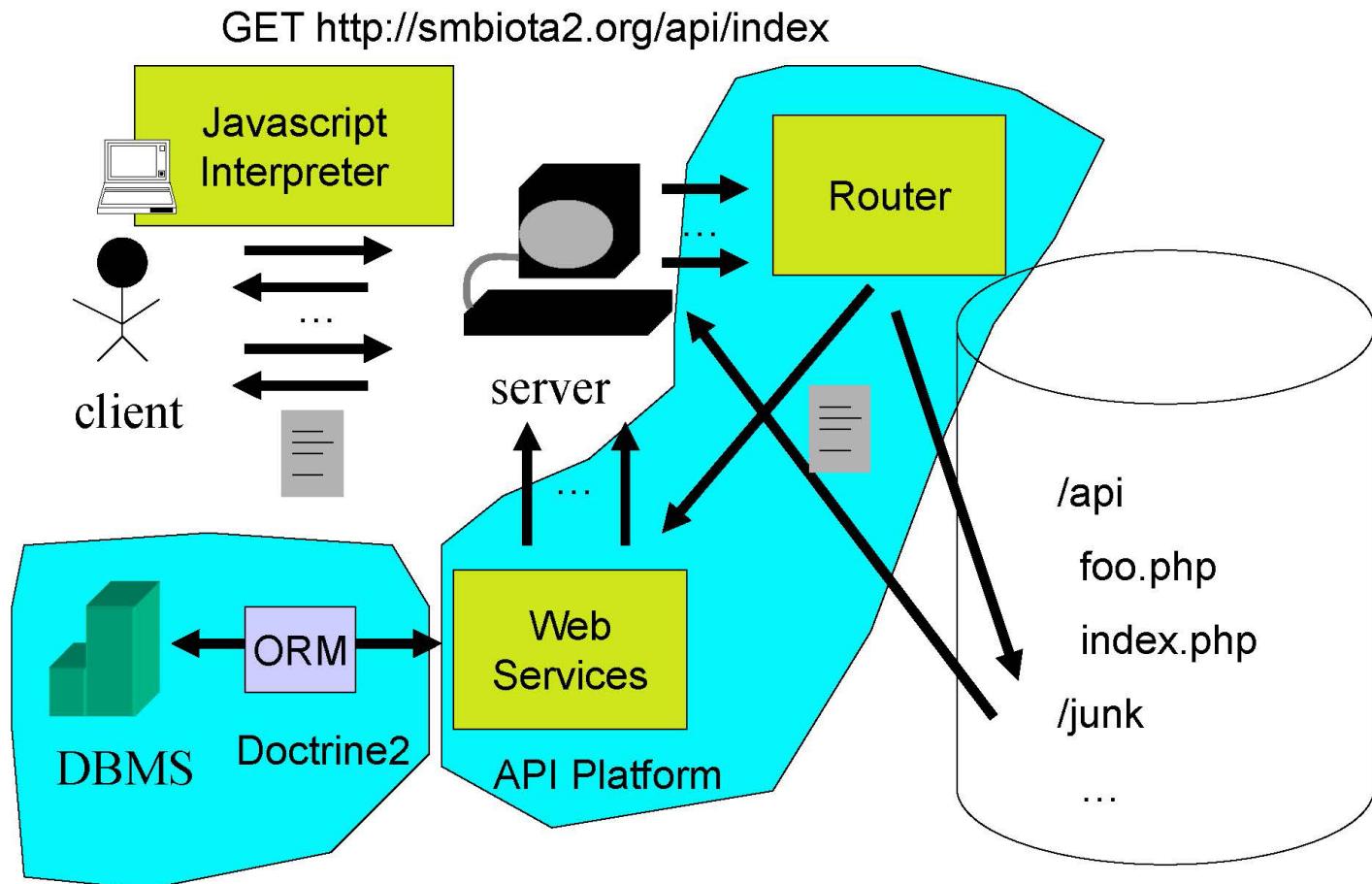
Product ID	Name	Price
8977	Banana	.79
8978	TV	400
8979	Watch	50



Objective 2b: Build API-Platform

Symfony

- Uses ORM and @API annotations
- Generates
 - Router
 - Web services
 - Documentation



Done!

Summary: Developers

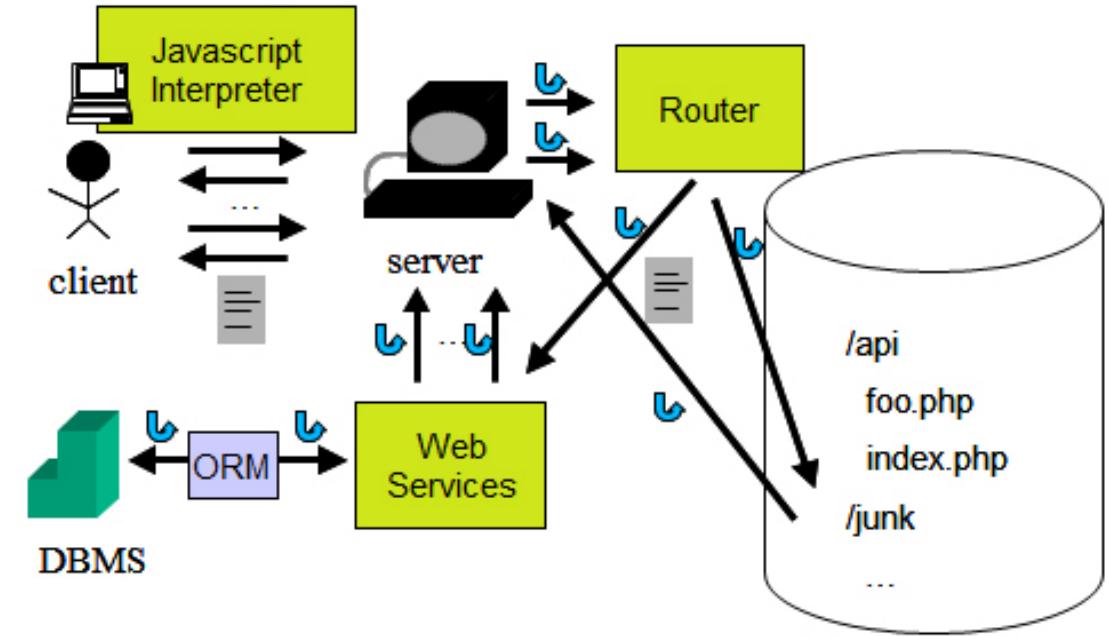
- Read-only developers
 - Got you covered
 - Use an existing [GET](#) web service
- Data modification developers
 - Use an existing [PUT](#) web service
 - Use event model to attach data cleaners/transformers
- Enable use with new kinds of data
 - Create ORM
 - Grow API Platform service end points from the ORM



Looking ahead

Programming objectives

- Make it easier to
 - Add tools
 - Integration into other workflows
 - Discover data and resources
 - Regionalize & specialize
- Network managers
 - Synonymy management
 - Phylogeny incorporation



Clean and translate plugin hooks

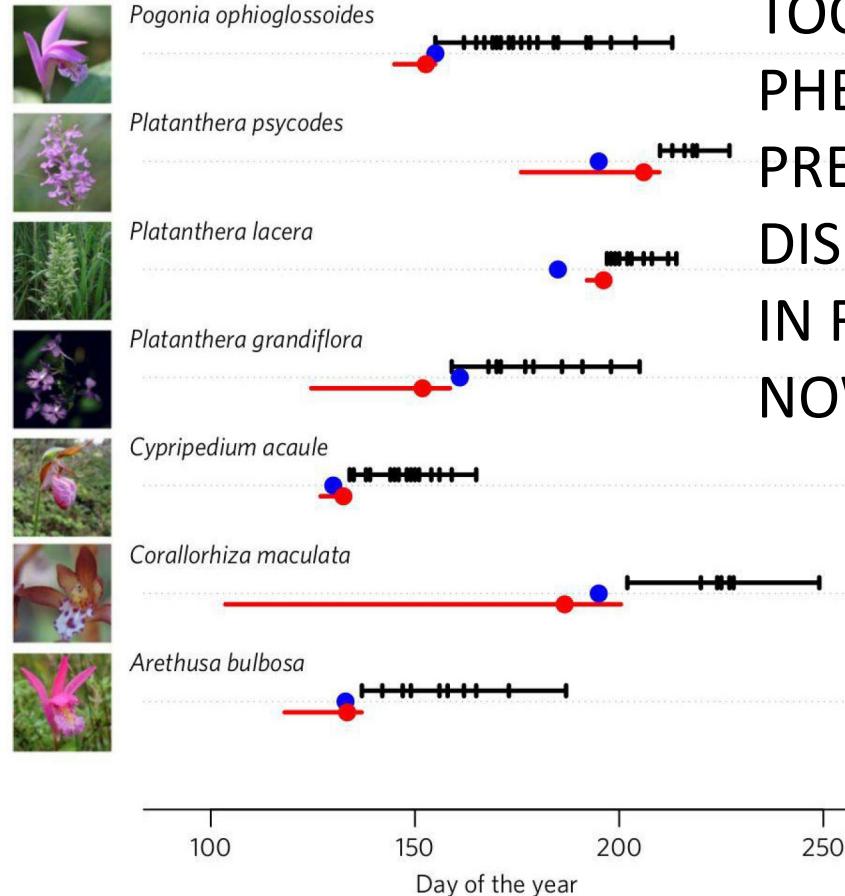


DBMS

Add layer of abstraction

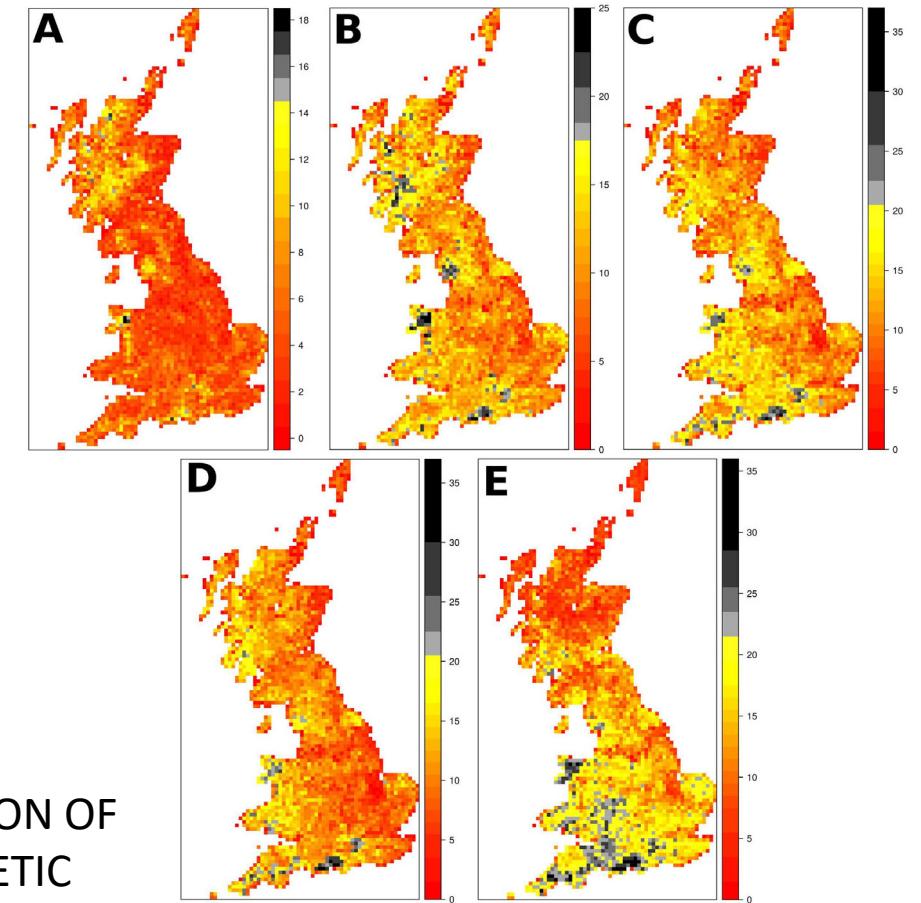
Integrate with other analytical workflows

Phenology prediction



LINK CHECKLIST
TOOL TO
PHENOLOGY
PREDICTION
DISPLAY WHAT'S
IN FLOWER
NOW

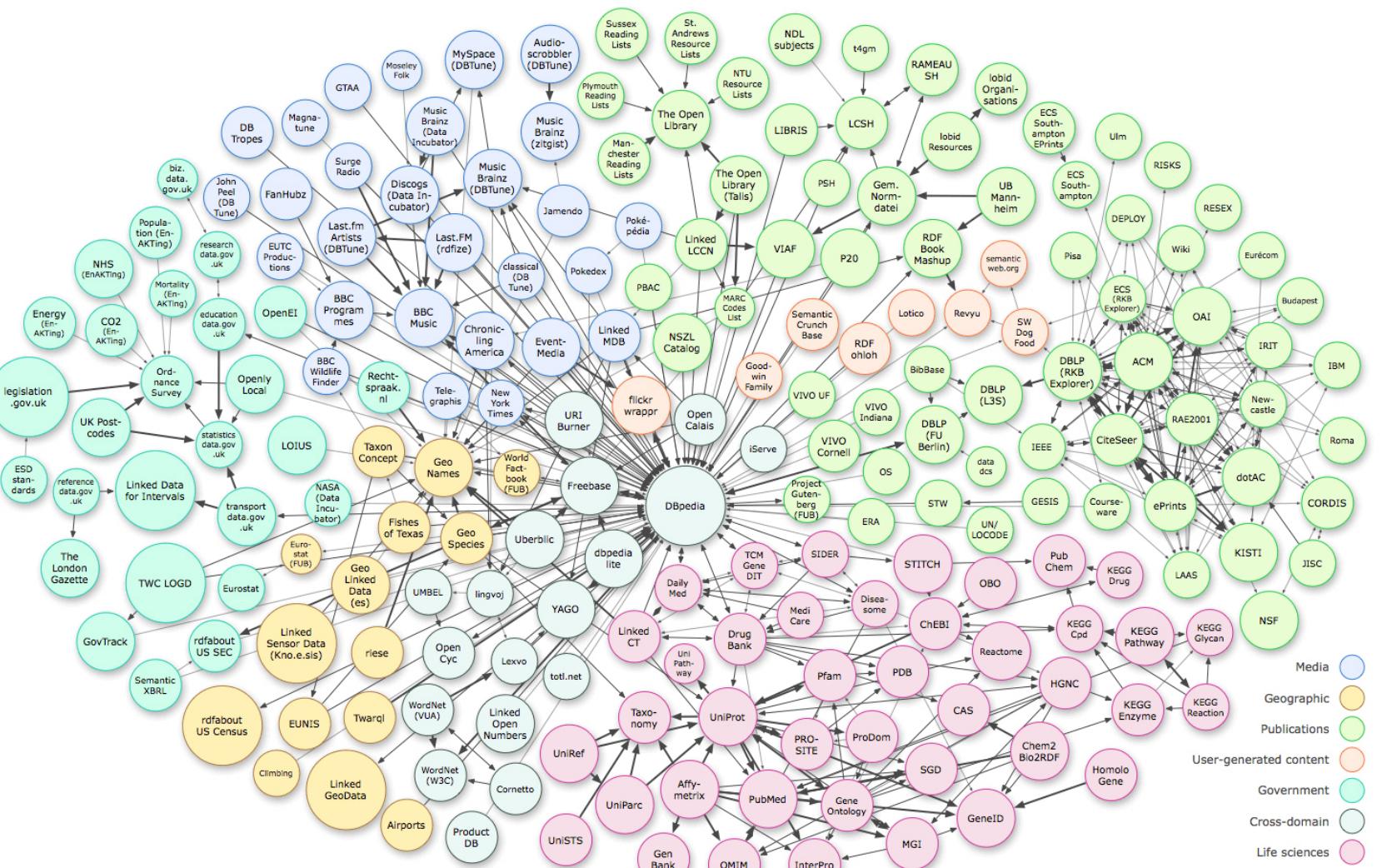
DISCOVER
DISTRIBUTION OF
PHYLOGENETIC
RICHNESS



Pearse et al. (2015) PLoS One

Pearse et al. (in press) Nat. Ecol. Evol.

Facilitate integration into knowledge graphs



As of September 2010

Regionalization

- Empower local people
 - Home page relatively easy
 - Instructions!
 - Language, alphabet, terms
 - Terms used in forms
 - Administrative regions

Network managers - taxonomic

- Names are fundamental for biodiversity data sharing
- Communicate changes and reasons
- Provide instructions on using new tools



Taraxacum officinale? *Taraxacum campylodes?*
Dandelion? Blowball?
Does it matter?

A wide-angle photograph of a mountain range. The peaks in the background are heavily covered in white snow, contrasting with the clear blue sky above. In the foreground, there are lower, rocky mountains with sparse vegetation. The overall scene is serene and majestic.

Thank you