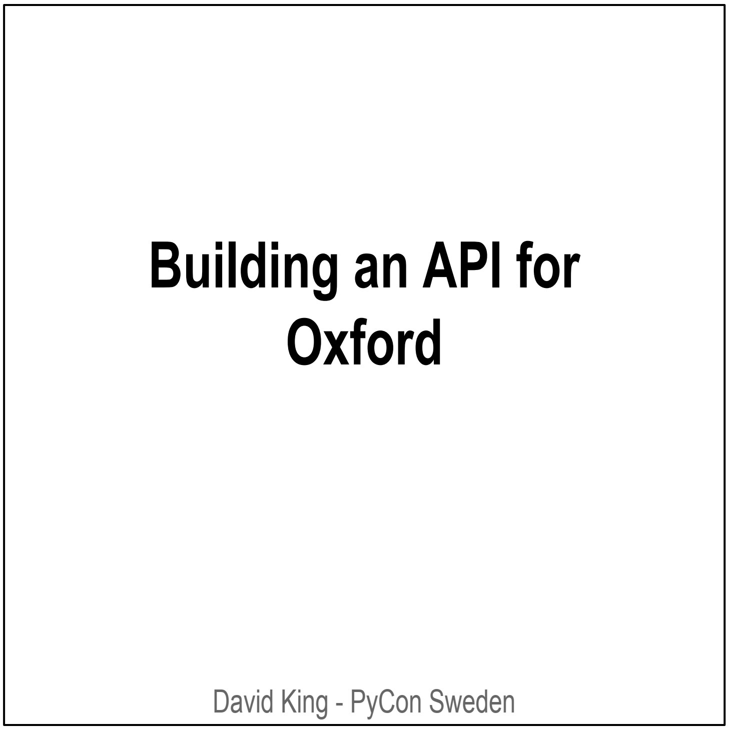
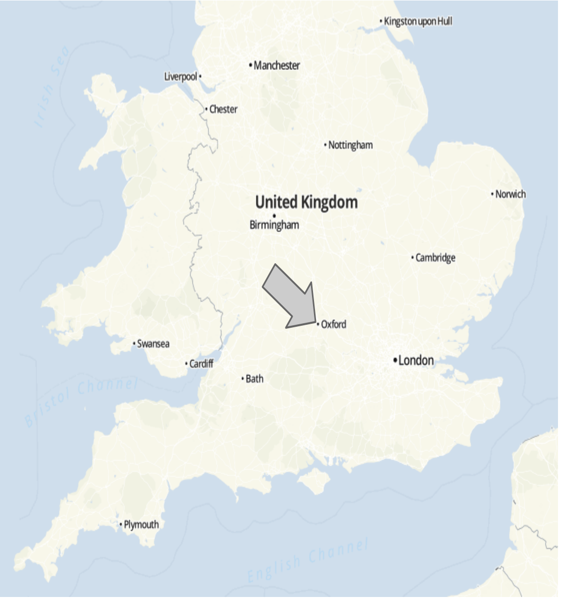


Building an API for Oxford

David King - PyCon Sweden

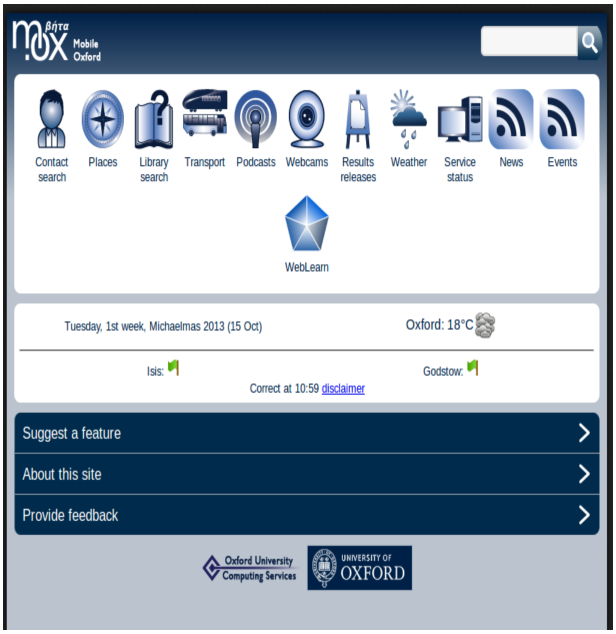
Working at the University of Oxford IT Services we’ve been building an API to aid us in building new applications for the University.



Where is Oxford?

What does Oxford look like? 40~ Colleges each with devolved IT systems, lots and lots of Libraries.

[m.ox.ac.uk](m.ox.ac.uk)



Tuesday, 1st week, Michaelmas 2013 (15 Oct)

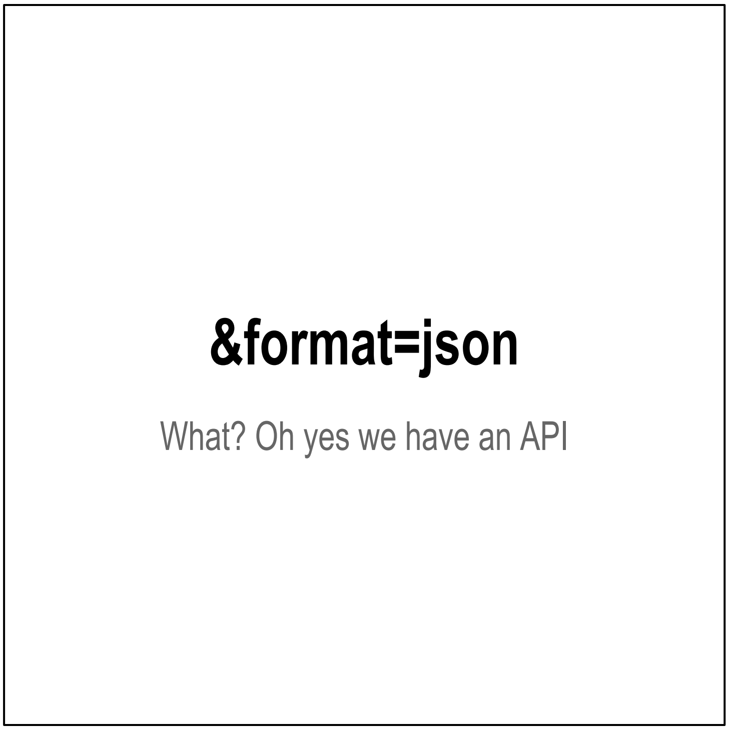
Oxford: 18°C

Isis:

Godstow:

Correct at 10:59 disclaimer

Mobile Oxford, built as part of a research project to bring some University services to a mobile friendly UI.



&format=json

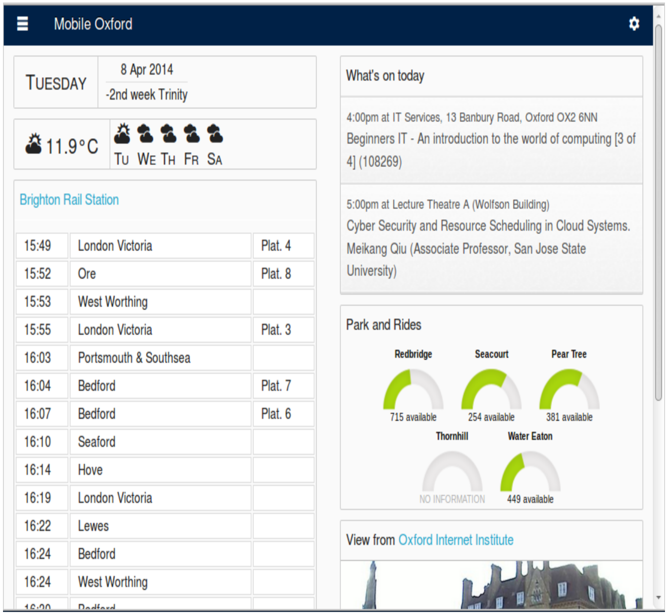
What? Oh yes we have an API

Provided a feature where any request could be made with this query string and the response would be in JSON to be used as an API. However it wasn’t supported as an API should be, instead the context to the template is serialized to JSON, coupling the interface with the API.

Matt Melling @kobowi 2 Mar 12
@mobileox I'm in your JSON, interfacing with your park and rides. pic.twitter.com/IXXdH8Wt
Retweeted by Mobile Oxford
View photo

People internal to the University and external were making use of this “API”.

new.m.ox.ac.uk



Mobile Oxford

TUESDAY

8 Apr 2014

-2nd week Trinity

11.9°C

Tu We Th Fr Sa

Brighton Rail Station

15:49	London Victoria	Plat. 4
15:52	Ore	Plat. 8
15:53	West Worthing	
15:55	London Victoria	Plat. 3
16:03	Portsmouth & Southsea	
16:04	Bedford	Plat. 7
16:07	Bedford	Plat. 6
16:10	Seaford	
16:14	Hove	
16:19	London Victoria	
16:22	Lewes	
16:24	Bedford	
16:24	West Worthing	

What's on today

4:00pm at IT Services, 13 Banbury Road, Oxford OX2 6NN
Beginners IT - An introduction to the world of computing [3 of 4] (108269)

5:00pm at Lecture Theatre A (Wolfson Building)
Cyber Security and Resource Scheduling in Cloud Systems. Meikang Qiu (Associate Professor, San Jose State University)

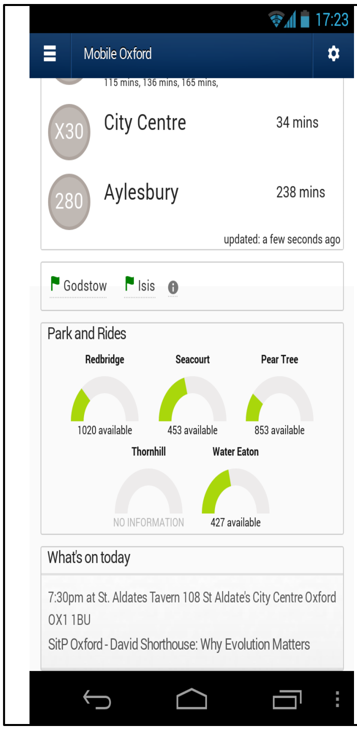
Park and Rides

Redbridge	Seacourt	Pear Tree
715 available	254 available	381 available

Thornhill	Water Eaton
NO INFORMATION	449 available

View from Oxford Internet Institute

Here’s the new Mobile Oxford using our API



115 mins, 136 mins, 165 mins,

X30	City Centre	34 mins
280	Aylesbury	238 mins

updated: a few seconds ago

Godstow Isis

Park and Rides

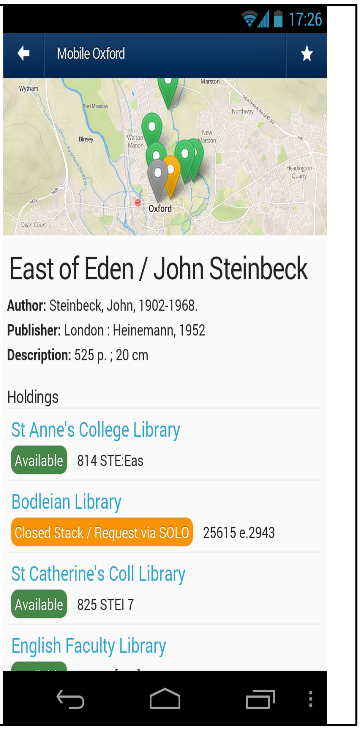
Redbridge	Seacourt	Pear Tree
1020 available	453 available	853 available

Thornhill	Water Eaton
NO INFORMATION	427 available

What's on today

7:30pm at St. Aldates Tavern 108 St Aldate's City Centre Oxford OX1 1BU

SitP Oxford - David Shorthouse: Why Evolution Matters



East of Eden / John Steinbeck

Author: Steinbeck, John, 1902-1968.

Publisher: London : Heinemann, 1952

Description: 525 p. ; 20 cm

Holdings

St Anne's College Library

Available 814 STE:Eas

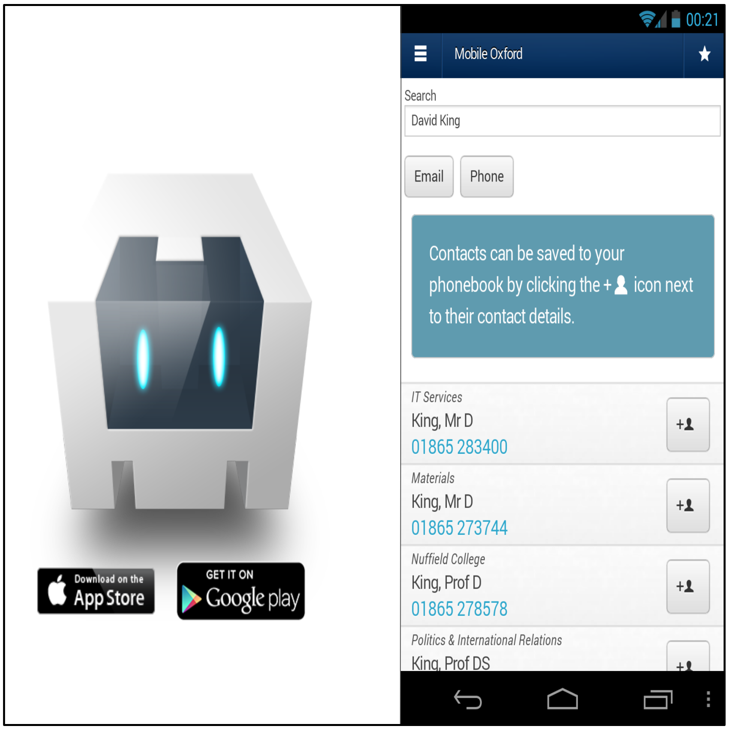
Bodleian Library

Closed Stack / Request via SOLO 25615 e.2943

St Catherine's Coll Library

Available 825 STEI 7

English Faculty Library



Search

David King

Contacts can be saved to your phonebook by clicking the +👤 icon next to their contact details.

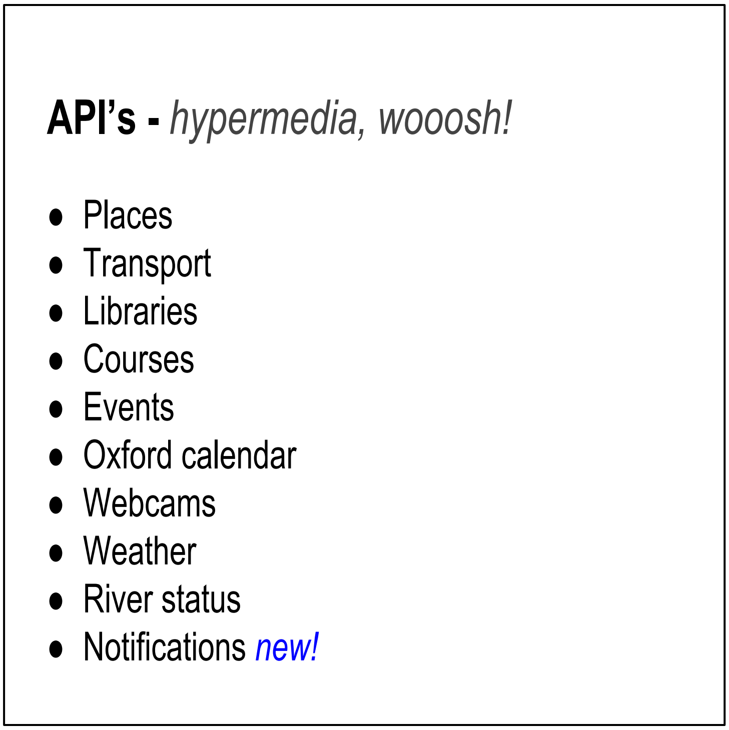
IT Services
King, Mr D
01865 283400

Materials
King, Mr D
01865 273744

Nuffield College
King, Prof D
01865 278578

Politics & International Relations
King, Prof DS

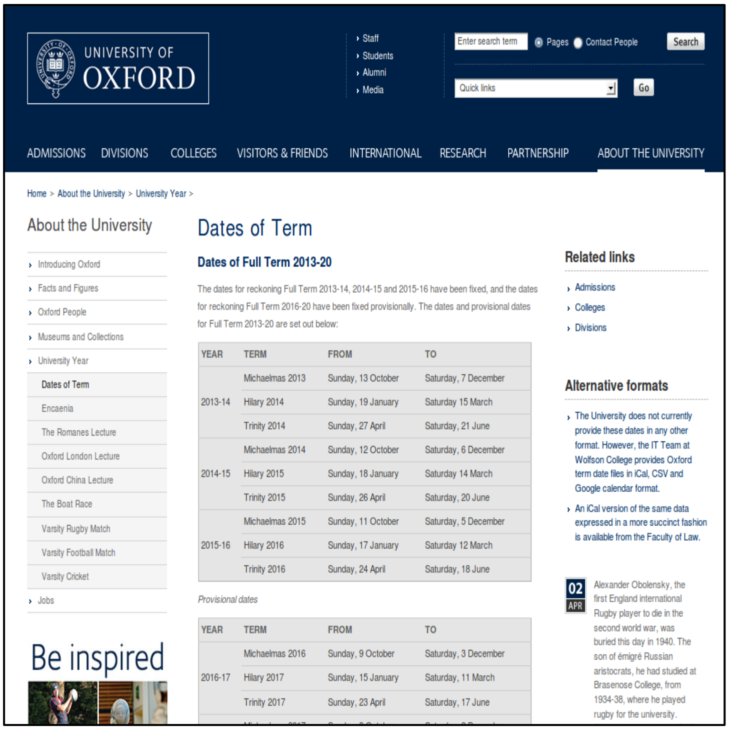
Packaged using Phonegap and on the app stores. We make use of native functionality to add events to the users phone and receive push notifications from the University Security Services.



API’s - *hypermedia, wooosh!*

- Places
- Transport
- Libraries
- Courses
- Events
- Oxford calendar
- Webcams
- Weather
- River status
- Notifications *new!*

The full set of API’s we had to build for this client.



Dates of Term

Dates of Full Term 2013-20

The dates for reckoning Full Term 2013-14, 2014-15 and 2015-16 have been fixed, and the dates for reckoning Full Term 2016-20 have been fixed provisionally. The dates and provisional dates for Full Term 2013-20 are set out below:

YEAR	TERM	FROM	TO
2013-14	Michaelmas 2013	Sunday, 13 October	Saturday, 7 December
	Hilary 2014	Sunday, 19 January	Saturday 15 March
	Trinity 2014	Sunday, 27 April	Saturday, 21 June
2014-15	Michaelmas 2014	Sunday, 12 October	Saturday, 6 December
	Hilary 2015	Sunday, 18 January	Saturday 14 March
	Trinity 2015	Sunday, 26 April	Saturday, 20 June
2015-16	Michaelmas 2015	Sunday, 11 October	Saturday, 5 December
	Hilary 2016	Sunday, 17 January	Saturday 12 March
	Trinity 2016	Sunday, 24 April	Saturday, 18 June

Provisional dates

YEAR	TERM	FROM	TO
2016-17	Michaelmas 2016	Sunday, 9 October	Saturday, 3 December
	Hilary 2017	Sunday, 15 January	Saturday, 11 March
	Trinity 2017	Sunday, 23 April	Saturday, 17 June

Related links

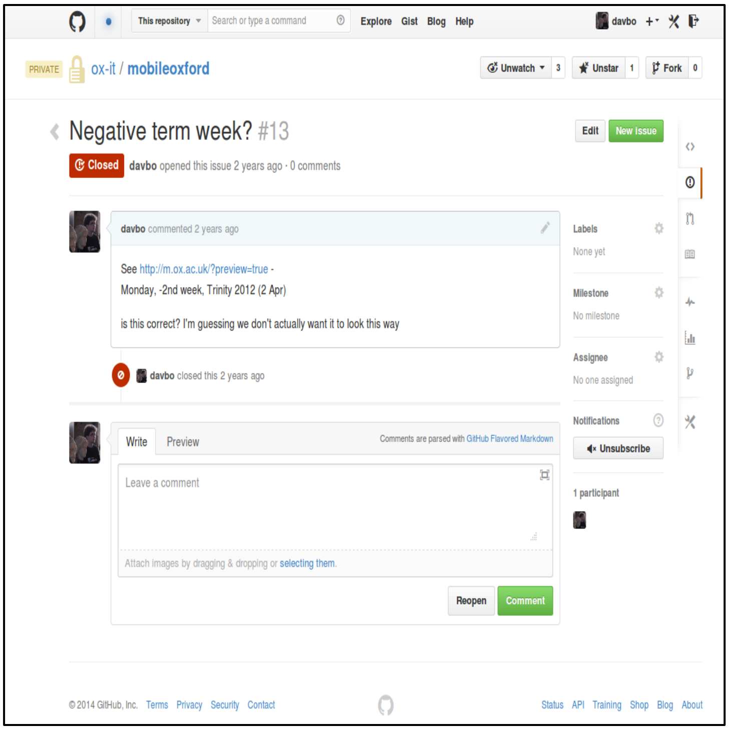
- Admissions
- Colleges
- Divisions

Alternative formats

- The University does not currently provide these dates in any other format. However, the IT Team at Wolfson College provides Oxford term date files in iCal, CSV and Google calendar format.
- An iCal version of the same data expressed in a more succinct fashion is available from the Faculty of Law.

02 APR Alexander Obolensky, the first England international Rugby player to die in the second world war, was buried this day in 1940. The son of émigré Russian aristocrats, he had studied at Brasenose College, from 1934-38, where he played rugby for the university.

Why do we need API’s for these things? Because many people are redoing the same work for example a programmatic way to access the University term dates. We have packages on PyPI and also CPAN for this already.



Negative term week? #13

Closed davbo opened this issue 2 years ago · 0 comments

davbo commented 2 years ago

See http://m.ox.ac.uk/?preview=true -
Monday, -2nd week, Trinity 2012 (2 Apr)

is this correct? I'm guessing we don't actually want it to look this way

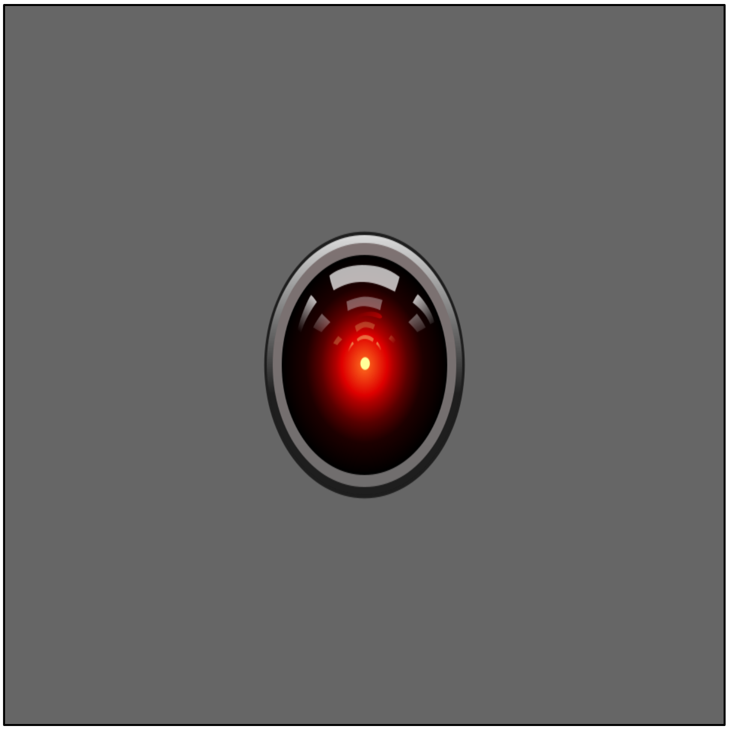
davbo closed this 2 years ago

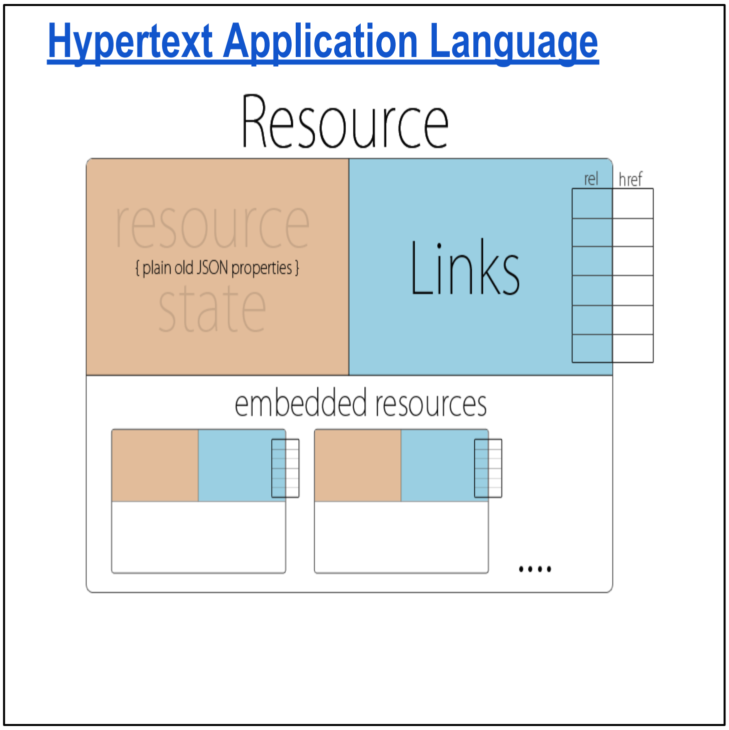
Oxford can be a strange place, a -2nd week of term is expected behaviour, application developers need to expect this.

api.m.ox.ac.uk

Live Demo, what could possibly go wrong

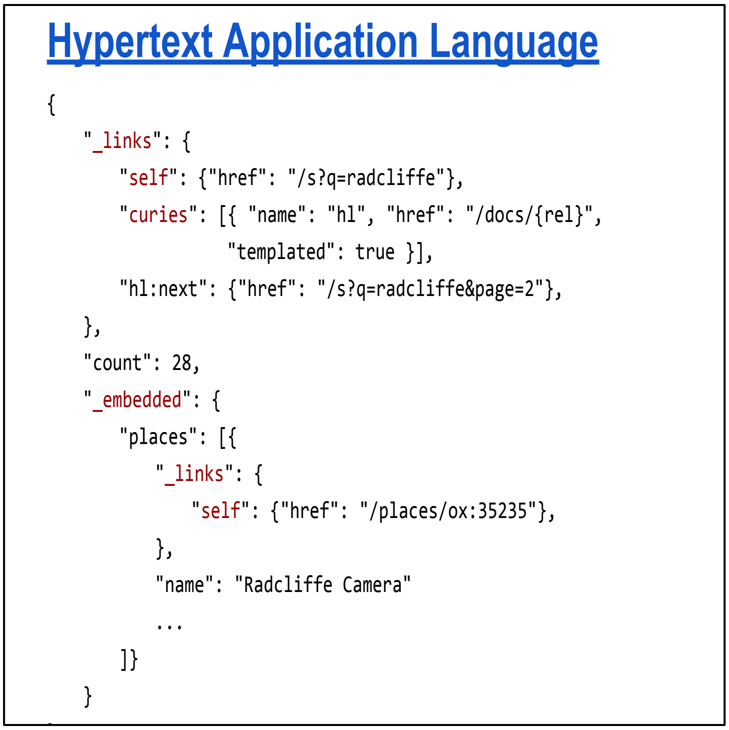
Check out our shiny new API.





Hypertext Application Language

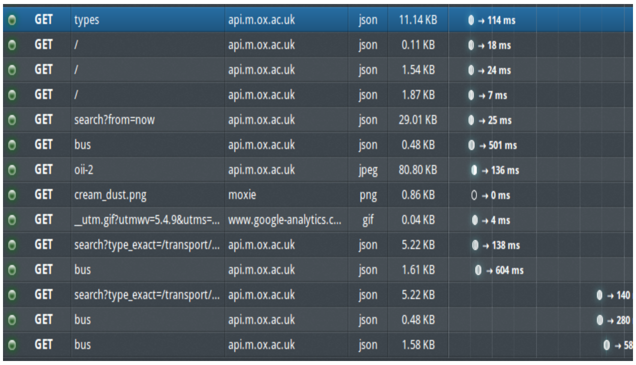
Built using HAL which is an easy way to bring some structure and provide links between API's.



Hypertext Application Language

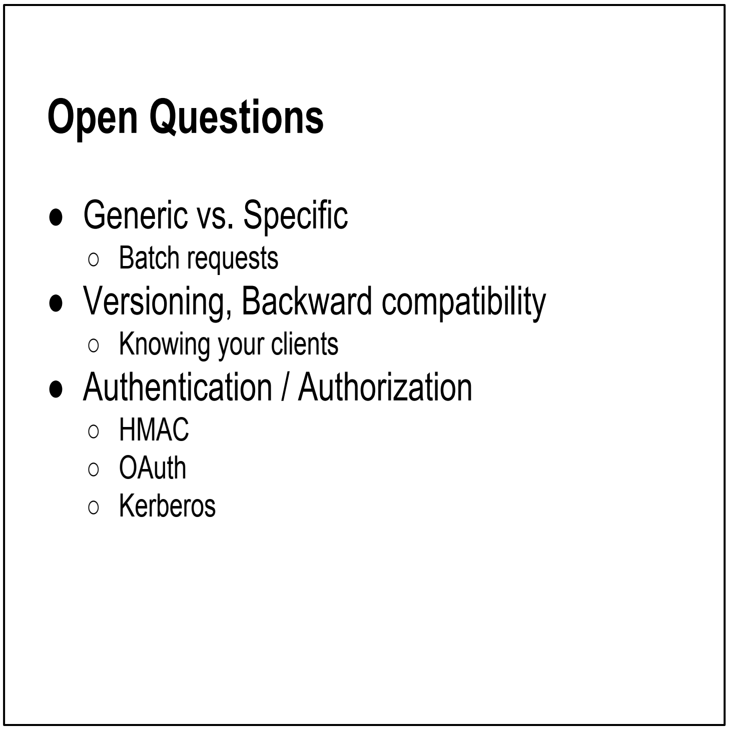
```
{
    "_links": {
        "self": {"href": "/s?q=radcliffe"},
        "curies": [{ "name": "hl", "href": "/docs/{rel}",
                    "templated": true }],
        "hl:next": {"href": "/s?q=radcliffe&page=2"},
    },
    "count": 28,
    "_embedded": {
        "places": [{
            "_links": {
                "self": {"href": "/places/ox:35235"},
            },
            "name": "Radcliffe Camera"
            ...
        ]}
    }
```

Example of a search response from our “places” API. See: http://api.m.ox.ac.uk/browser/#/places/search?q=radcliffe



●	GET	types	api.m.ox.ac.uk	json	11.14 KB	→ 114 ms
●	GET	/	api.m.ox.ac.uk	json	0.11 KB	→ 18 ms
●	GET	/	api.m.ox.ac.uk	json	1.54 KB	→ 24 ms
●	GET	/	api.m.ox.ac.uk	json	1.87 KB	→ 7 ms
●	GET	search?from=now	api.m.ox.ac.uk	json	29.01 KB	→ 25 ms
●	GET	bus	api.m.ox.ac.uk	json	0.48 KB	→ 501 ms
●	GET	oii-2	api.m.ox.ac.uk	jpeg	80.80 KB	→ 136 ms
●	GET	cream_dust.png	moxie	png	0.86 KB	→ 0 ms
●	GET	__utm.gif?utmwv=5.4.9&utms=...	www.google-analytics.c...	gif	0.04 KB	→ 4 ms
●	GET	search?type_exact=/transport/...	api.m.ox.ac.uk	json	5.22 KB	→ 138 ms
●	GET	bus	api.m.ox.ac.uk	json	1.61 KB	→ 604 ms
●	GET	search?type_exact=/transport/...	api.m.ox.ac.uk	json	5.22 KB	→ 140
●	GET	bus	api.m.ox.ac.uk	json	0.48 KB	→ 280
●	GET	bus	api.m.ox.ac.uk	json	1.58 KB	→ 58

We end up making lots of JSON requests for a single page load, how can we solve this?



Open Questions

- Generic vs. Specific
  - Batch requests
- Versioning, Backward compatibility
  - Knowing your clients
- Authentication / Authorization
  - HMAC
  - OAuth
  - Kerberos

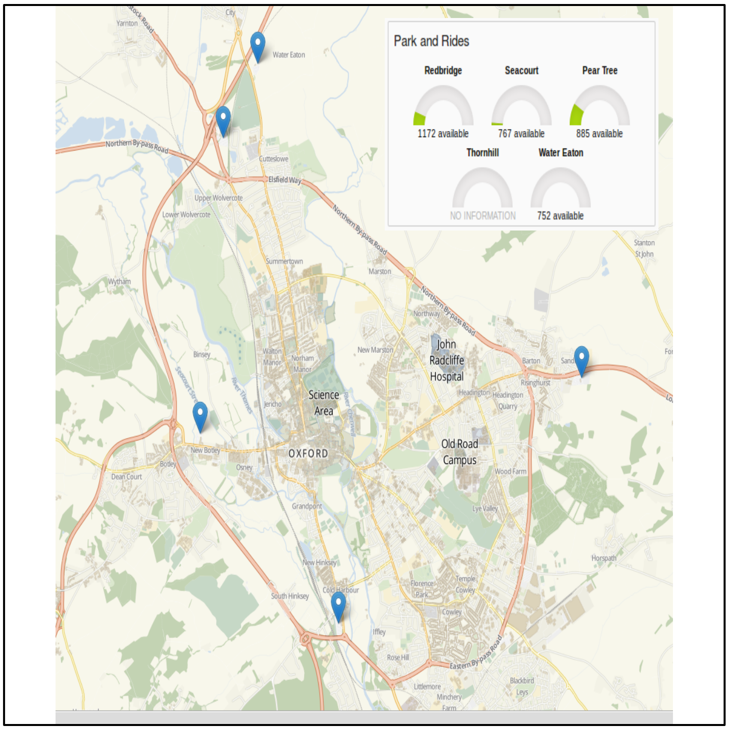
We could make batched requests to the API, this way we can keep the API as generic as possible. Some other problems the project is facing now.

Making use of open data

- Combining “trusted” data with large open data sets
    - OpenStreetMap + OxPoints
- Transforming, Indexing
- Transport data
    - NaPTAN
- Supplement services
    - Reference vs. Live data
    - TransXChange, GTFS?

Making use of external services

- Local gov services
    - Live bus times
    - Car parking spaces
    - Oxford Boris bikes
- Other local services
    - Oxford river safety
    - Bod library search, z39.50 (pre-web)
- National services
    - National Rail
- Pick your battles
    - Not just wrapping something in JSON
    - Where can we bring some added value? - Libraries



Park and Rides

Redbridge
1172 available

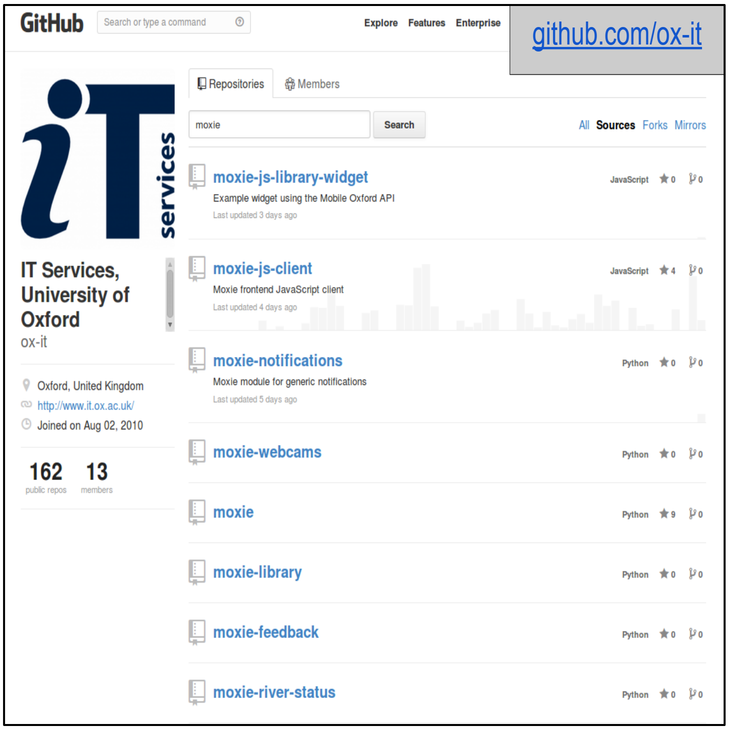
Seacourt
767 available

Pear Tree
885 available

Thornhill
NO INFORMATION

Water Eaton
752 available

What can we do when we bring these things together? Map of the car parks surrounding Oxford and their live capacity information.



GitHub Search or type a command

Explore Features Enterprise

github.com/ox-it

IT Services, University of Oxford

ox-it

Oxford, United Kingdom

http://www.it.ox.ac.uk/

Joined on Aug 02, 2010

162 public repos 13 members

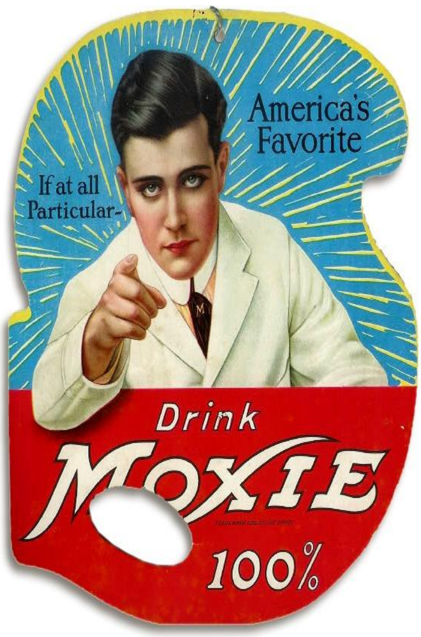
Repositories Members

moxie Search

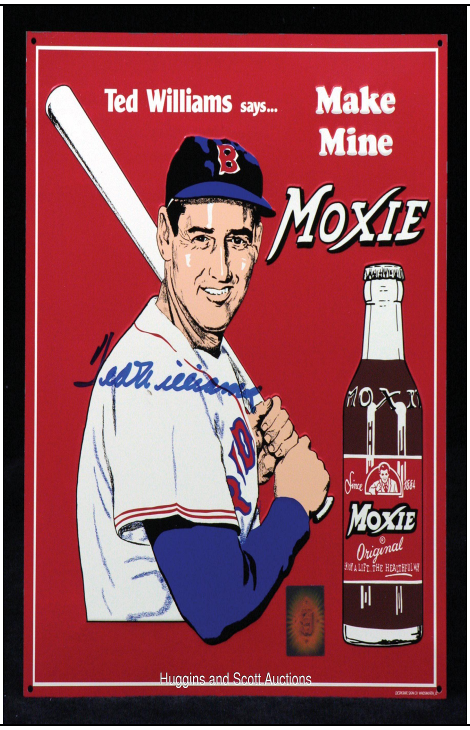
All **Sources** Forks Mirrors

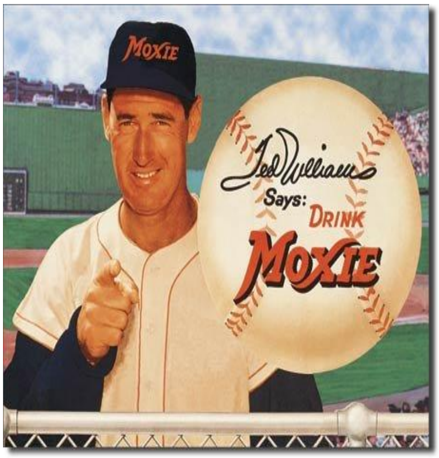
Repository	Language	★	Forks
moxie-js-library-widget Example widget using the Mobile Oxford API Last updated 3 days ago	JavaScript	0	0
moxie-js-client Moxie frontend JavaScript client Last updated 4 days ago	JavaScript	4	0
moxie-notifications Moxie module for generic notifications Last updated 5 days ago	Python	0	0
moxie-webcams	Python	0	0
moxie	Python	9	0
moxie-library	Python	0	0
moxie-feedback	Python	0	0
moxie-river-status	Python	0	0

See all the repositories starting with “moxie” for more details. All open source on our github organisation.



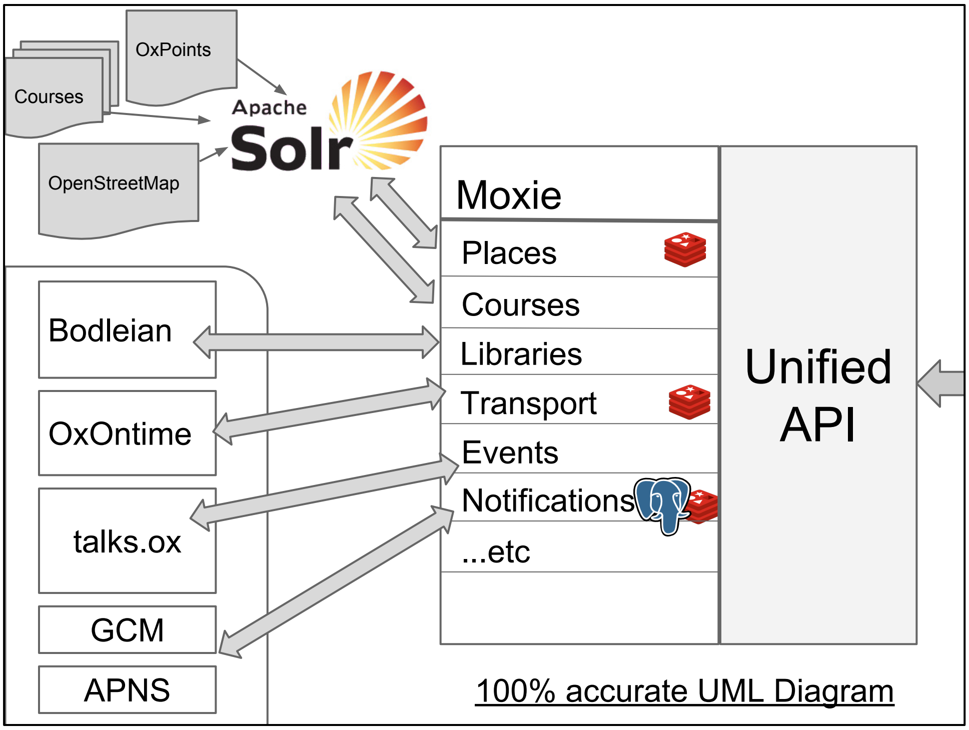
Vintage US soda. Great branding!


Ted Williams says...
Make Mine
MOXIE
MOXIE
Since 1884
MOXIE
Original
GIVES A LIFT...THE HEALTHFUL WAY

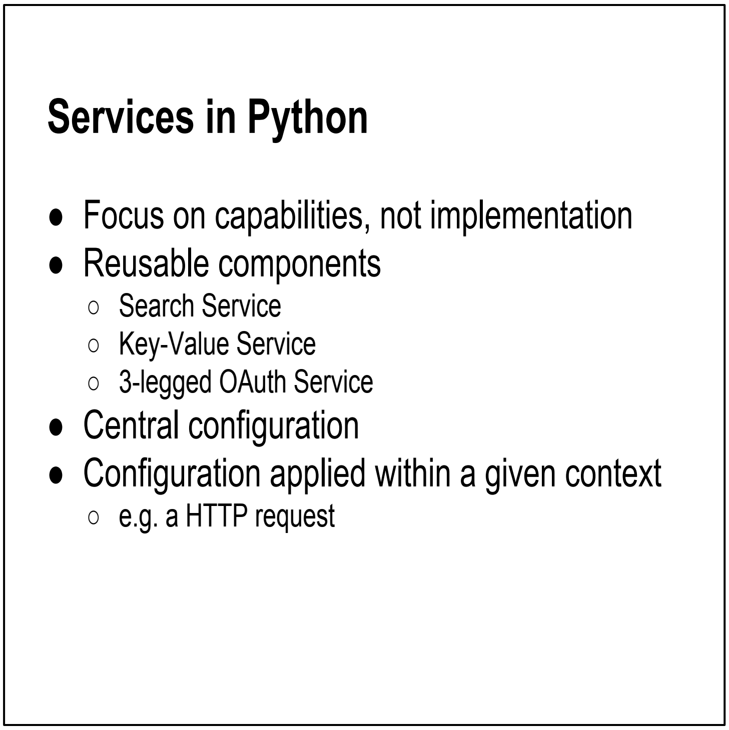

MOXIE
Ted Williams
Says: DRINK
MOXIE

Moxie Features

- Services for everything
  - Creating a Push Notification
  - Querying RDBMS, Key-Value store, Search Server
- Healthchecks
- External providers e.g. OpenStreetMap
  - Managed by Celery tasks
- Many small Flask app’s registered to a single app through “Blueprints”



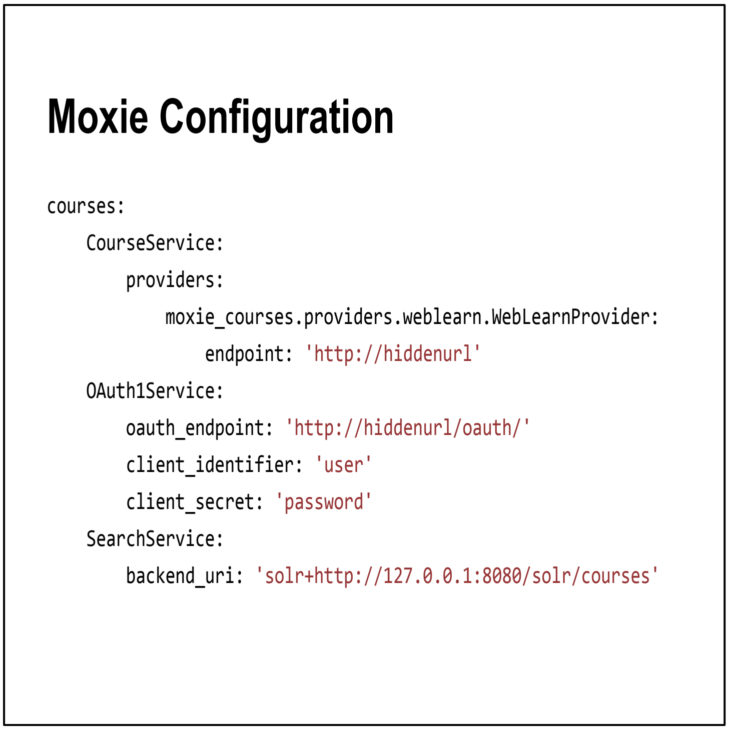
What does the project look like when deployed? Our technology stack.



Services in Python

- Focus on capabilities, not implementation
- Reusable components
  - Search Service
  - Key-Value Service
  - 3-legged OAuth Service
- Central configuration
- Configuration applied within a given context
  - e.g. a HTTP request

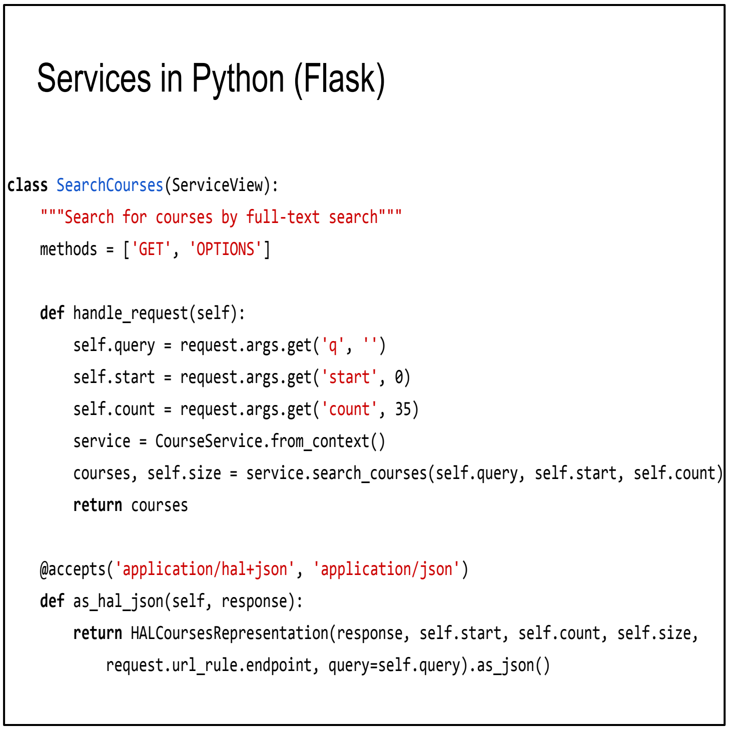
How have we used “Services” when implementing Moxie. We use this to decouple us from technology but also the external services we use.



Moxie Configuration

```
courses:
    CourseService:
        providers:
            moxie_courses.providers.weblearn.WebLearnProvider:
                endpoint: 'http://hiddenurl'
    OAuth1Service:
        oauth_endpoint: 'http://hiddenurl/oauth/'
        client_identifier: 'user'
        client_secret: 'password'
    SearchService:
        backend_uri: 'solr+http://127.0.0.1:8080/solr/courses'
```

Configuration we apply to the courses blueprint when we create it. What services are used and their configurations.



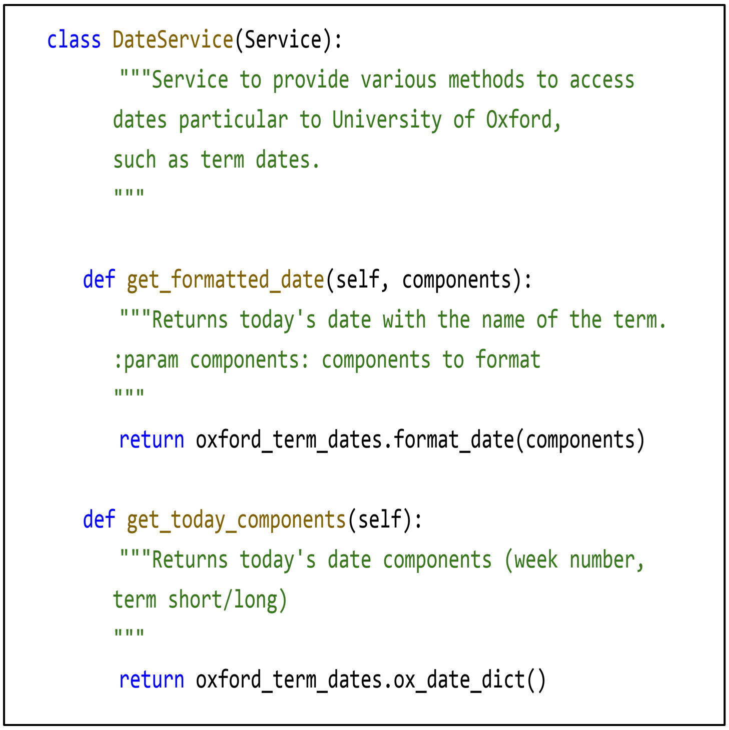
Services in Python (Flask)

```
class SearchCourses(ServiceView):
    """Search for courses by full-text search"""
    methods = ['GET', 'OPTIONS']

    def handle_request(self):
        self.query = request.args.get('q', '')
        self.start = request.args.get('start', 0)
        self.count = request.args.get('count', 35)
        service = CourseService.from_context()
        courses, self.size = service.search_courses(self.query, self.start, self.count)
        return courses

    @accepts('application/hal+json', 'application/json')
    def as_hal_json(self, response):
        return HALCoursesRepresentation(response, self.start, self.count, self.size,
            request.url_rule.endpoint, query=self.query).as_json()
```

What does it look like to use a Service from a “ServiceView”. Here we search an index given a user query, also shown is content-negotiation for HAL+JSON.

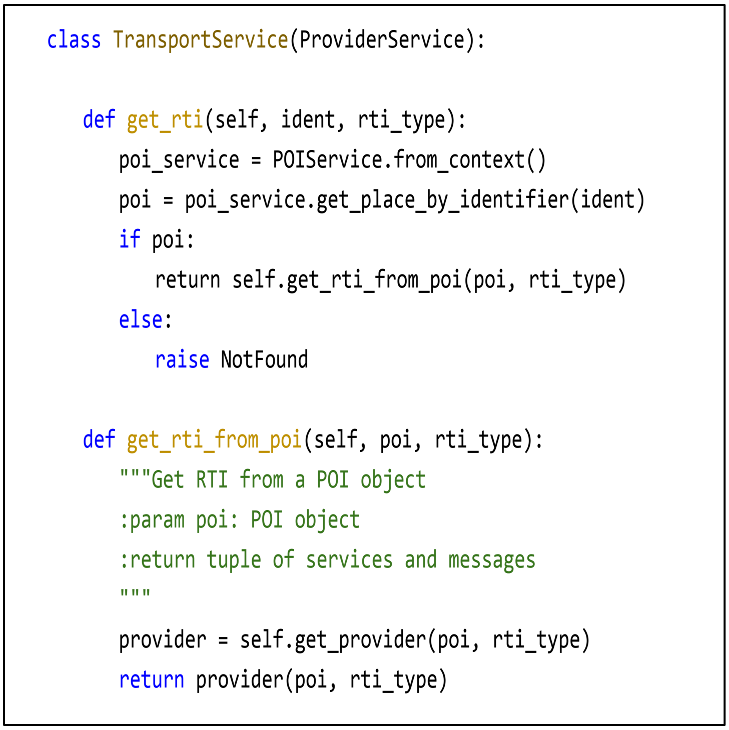


```python
class DateService(Service):
        """Service to provide various methods to access
        dates particular to University of Oxford,
        such as term dates.
        """


    def get_formatted_date(self, components):
        """Returns today's date with the name of the term.
        :param components: components to format
        """
        return oxford_term_dates.format_date(components)

    def get_today_components(self):
        """Returns today's date components (week number,
        term short/long)
        """
        return oxford_term_dates.ox_date_dict()
```

Simple service which defines an API to access the Oxford date and means we can replace the oxford_term_dates module at a later time and other modules using this Service will continue to work.



```
class TransportService(ProviderService):

    def get_rti(self, ident, rti_type):
        poi_service = POIService.from_context()
        poi = poi_service.get_place_by_identifier(ident)
        if poi:
            return self.get_rti_from_poi(poi, rti_type)
        else:
            raise NotFound

    def get_rti_from_poi(self, poi, rti_type):
        """Get RTI from a POI object
        :param poi: POI object
        :return tuple of services and messages
        """
        provider = self.get_provider(poi, rti_type)
        return provider(poi, rti_type)
```

More complex example with the “ProviderService” where the provider might be the National Rail or Oxontime for local Oxford bus times. For a given Point of Interest e.g. Bus stop or Train station, we find the appropriate “provider” and call it.

Q&A?

dave@davbo.org
@davbo