



# Applications, Algorithms and Data: Open Educational Resources and the Next Generation of Virtual Learning

Stephen Downes  
RELIF  
Hammamet, Tunisia  
November 30, 2017

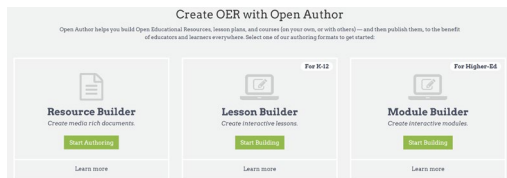
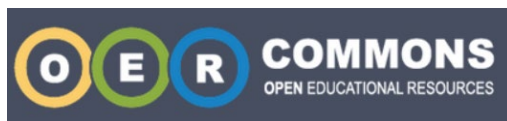
<http://www.downes.ca/presentation/481>

# State of the Art

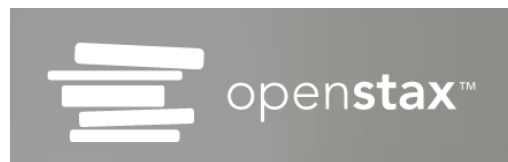


# OER Repositories

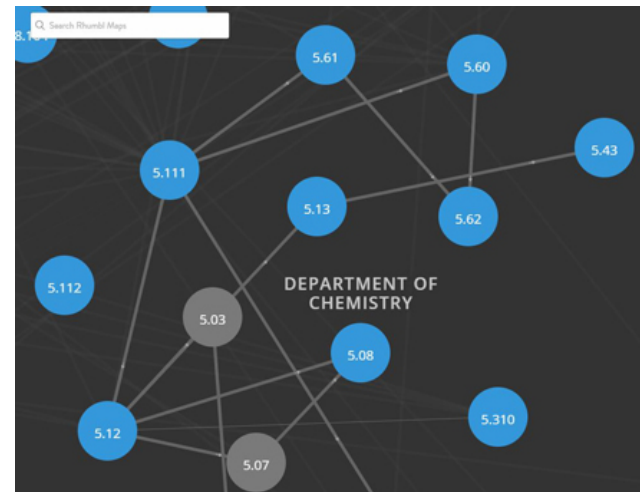
---



<https://www.oercommons.org/>



<https://openstax.org/>



<https://ocw.mit.edu/>

OERs are now widely available through subject-specific libraries with provisions for authoring as well

<http://irsc.libguides.com/openeducationalresources/oerrepositories>

# Open Resources, Open Teaching

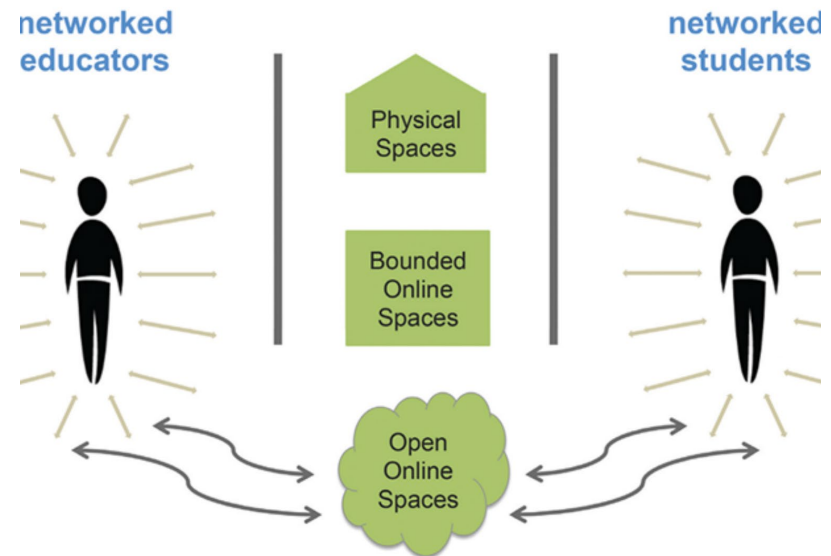
Open Pedagogy – Using OER to Change How We Teach – Heather Ross

<https://words.usask.ca/gmcte/2016/09/26/open-pedagogy-using-oer-to-change-how-we-teach/>

Open Education, Open Questions – Catherine Cronin

<https://er.educause.edu/articles/2017/10/open-education-open-questions>

“The use of open practices by learners and educators is complex, personal, and contextual; it is also continually negotiated.”



1. A Model for Networked Education (Credit: Image by Catherine Cronin<sup>1</sup>, building on *Networked Teacher*<sup>2</sup> by Alec Couros. CC BY-SA)



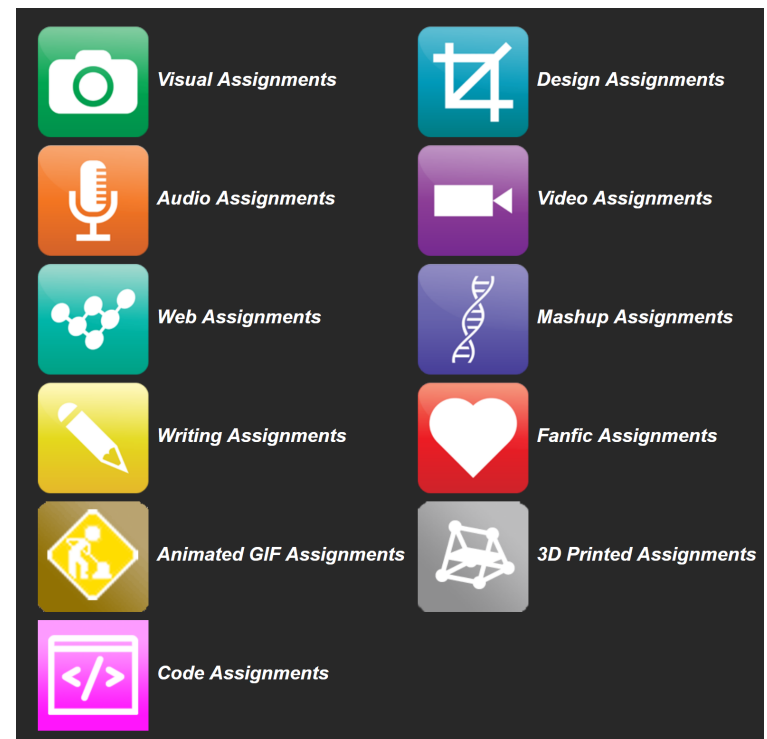
# OERs as Student Production

---

DS106 – assignment bank  
<http://assignments.ds106.us/>

Domain of One's Own -  
<https://reclaimhosting.com/domain-of-ones-own/>

Creation of OERs through 'renewable assignments' – Christina Hendricks  
<http://flexible.learning.ubc.ca/news-events/renewable-assignments-student-work-adding-value-to-the-world/>



# Open Case Studies

Case studies that can be used by anyone, at UBC or elsewhere.

Many focus on topics in sustainability

cases on this site are open educational resources: they have an open license to allow for revision and reuse of the cases in other courses and contexts

Quoted from: <http://cases.open.ubc.ca/>



## GWAII HAANAS NATIONAL PARK PRESERVE

Gwaii Haanas Park reserve and Haida Heritage site is an archipelago of 138 islands that lies 130km off the coast of mainland British Columbia; known simply as Gwaii Haanas, this area is protected as both a National Park reserve and an important Herit...

[Read More](#)



## FORT MCMURRAY AND THE FIRES OF CLIMATE CHANGE

Fort McMurray, located in a beautiful service area with vast oil sands deposit in northeast of Alberta, is surrounded by peatlands and boreal forests of aspen and spruce. Though normally very wet, Fort McMurray is relative dry and hot in summer, and ...

[Read More](#)



## ECOLOGICAL AND SOCIAL COSTS OF COTTON FARMING

In today's age, cotton is one of the most versatile crops that the earth has to offer. Many of us are familiar with the usage of clothing in cotton, but cotton is also used in beauty products and food products as well. Look at the clothes that you ar...

[Read More](#)



## GOLF COURSE CONSERVATION MANAGEMENT

Urbanization is a trend that continues to remain consistent and dominant in our world today. Countries continue to expand infrastructure and grow industry in order to meet both global and national demands. As countries develop, rural landscapes are C...

[Read More](#)



## SUBURBAN GOLF COURSE

There is much debate within our society today about whether or not golf courses provide conservation value. While some articles portray golf courses as improving conservation value by creating habitat for sensitive organisms, others sources are cynic...

[Read More](#)



## CULTURAL KEYSTONE PLACES

The Colorado river delta was once a thriving and biological productive region, which spanned two million acres across Northwestern Mexico. However, by the middle of the twentieth century, the Colorado river began to be diverted and dammed for irrigat...

[Read More](#)



## BIOFUELS

Biofuel is the product of the refinement of plant biomass which can then be burned for heat or light energy. It is made of organic matter, either directly from plants or indirectly from domestic, industrial or commercial wastes. There are different t...

[Read More](#)

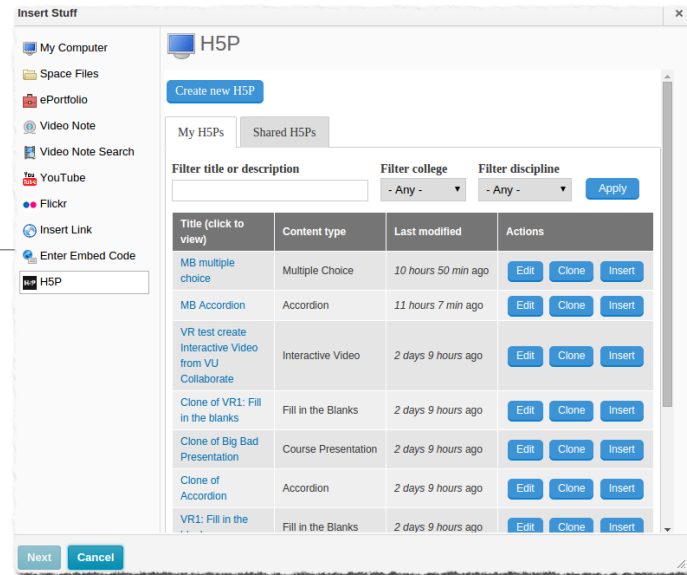
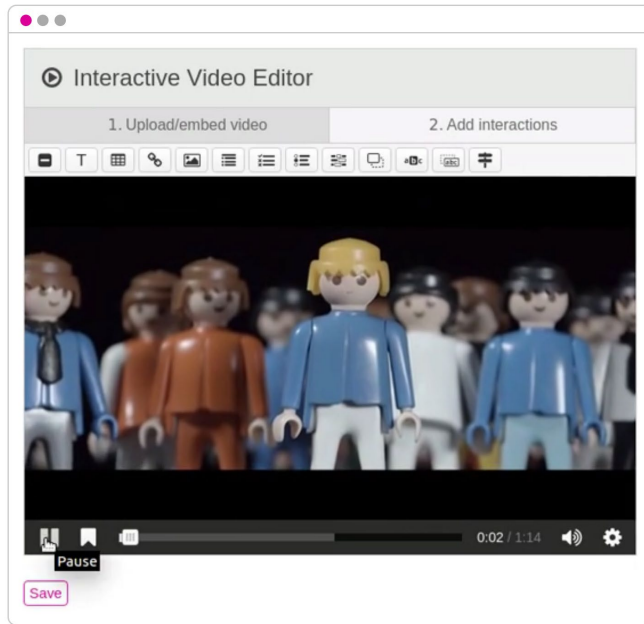


## TEACHER BLOGGER

Sarah has recently begun her first contract as a certified teacher at a high school in Vancouver. The position allows her to teach Physical Education and coach one of the school's basketball teams, which is exciting for her, as she is able to bring t...

[Read More](#)

# H5P



<https://h5p.org/h5p-plus-brightspace-equals-smashing-interactive-learning>

H5P is an abbreviation for HTML5 Package, and aims to make it easy for everyone to create, share and reuse interactive HTML5 content. – Wikipedia

<https://en.wikipedia.org/wiki/H5P>

H5P is available as a Moodle plugin, a Drupal module and a WordPress plugin. <https://h5p.org/>

# Content Syndication

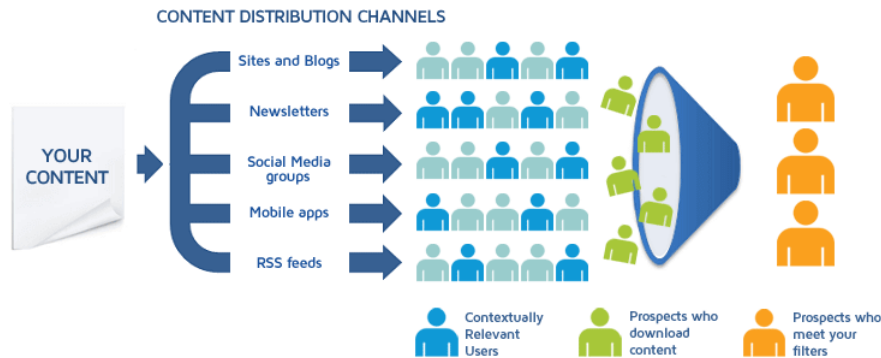


Image:

<https://blog.izooto.com/best-content-syndication-tools/>

Blog posts and comments were the core of CCK08

- gRSShopper – <http://grssshopper.downes.ca>

FeedPress - <https://wordpress.org/plugins/feedpress/>

FeedBurner - <https://feedburner.google.com>



# Scrapy

## Terminal

```
$ pip install scrapy
$ cat > myspider.py <<EOF
import scrapy

class BlogSpider(scrapy.Spider):
    name = 'blogspider'
    start_urls = ['https://blog.scrapinghub.com']

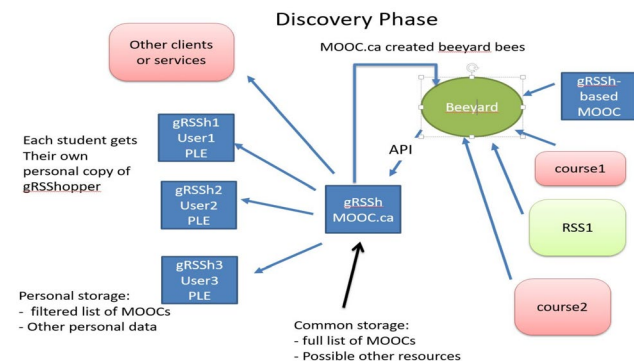
    def parse(self, response):
        for title in response.css('h2.entry-title'):
            yield {'title': title.css('a ::text').extract_first()}

        for next_page in response.css('div.prev-post > a'):
            yield response.follow(next_page, self.parse)
EOF
$ scrapy runspider myspider.py
```

<https://scrapy.org/>

Python framework to aggregate and store content in RSS feeds and web sites

Forms the core of the NRC-developed 'Beeyard' application



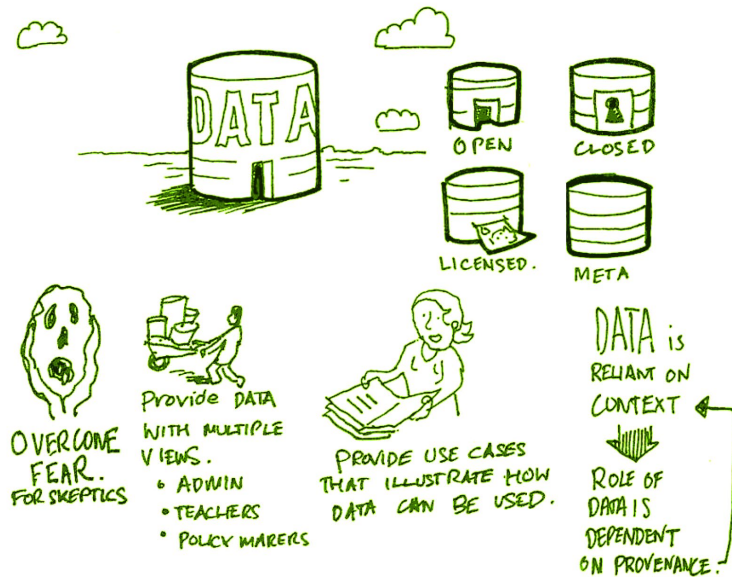
# MOOC.ca and gRSShopper



<http://grssshopper.downes.ca/>

[www.mooc.ca](http://www.mooc.ca) is an aggregator of MOOC course offerings (and is planned to aggregate OERs as well) using gRSShopper and Beeyard

# Open Data as OERs



Civic engagement in Italy

Into programming assignments

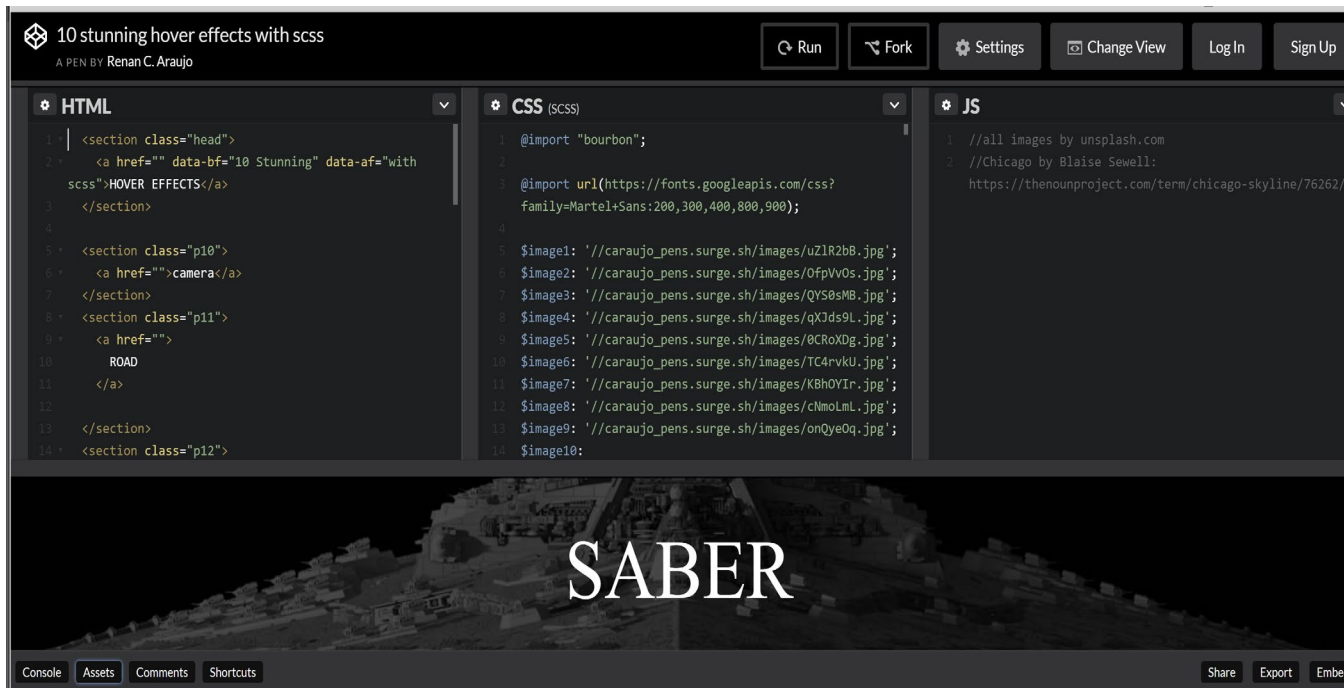
Article-level metrics

Geodata and Land Walks in Wales

Open data for sustainable development

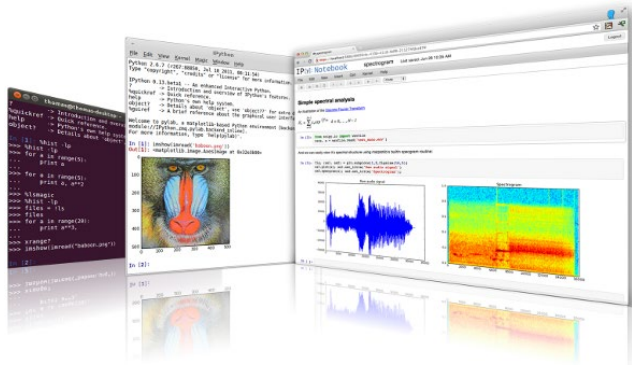
Atenas, J., & Havemann, L. (Eds.). (2015). Open Data as Open Educational Resources: Case studies of emerging practice. London: Open Knowledge, Open Education Working Group. <http://dx.doi.org/10.6084/m9.figshare.1590031>  
Also: Leo Havemann, slides [http://eprints.bbk.ac.uk/14750/1/Leo\\_ODasOER\\_UCL\\_4March16.pdf](http://eprints.bbk.ac.uk/14750/1/Leo_ODasOER_UCL_4March16.pdf)

# CodePen



<https://codepen.io/caraujo/pen/LVPzxO>

# iPython and Jupyter



iPython is an interactive programming shell for the Python programming language <https://ipython.org/>



The Jupyter Notebook is an open-source web application that allows you to create and share documents that contain live code... <http://jupyter.org/>



# A gallery of Jupyter Notebooks

```
In [4]: my @svg = split ' ', q[
        https://upload.wikimedia.org/wikipedia/commons/f/fd/G
        https://upload.wikimedia.org/wikipedia/commons/f/f9/L
        ];
        IPerl->display( IPerl->svg( $_ , width => "200" ) ) for @svg;
        $png_display;
```



<https://github.com/jupyter/jupyter/wiki/A-gallery-of-interesting-Jupyter-Notebooks#machine-learning-statistics-and-probability>

noise, rotational and glacial seismology, and more.

## Linguistics and Text Mining

- [Workshop on text analysis](#) by Neal Caren.
- [Detecting Algorithmically Generated Domains](#), part of the [Data Hacking](#) collection on security-oriented data analysis with IPython & friends.
- [Mining the Social Web \(2nd Edition\)](#). A complete collection of notebooks accompanying Matthew Russel's book by O'Reilly.

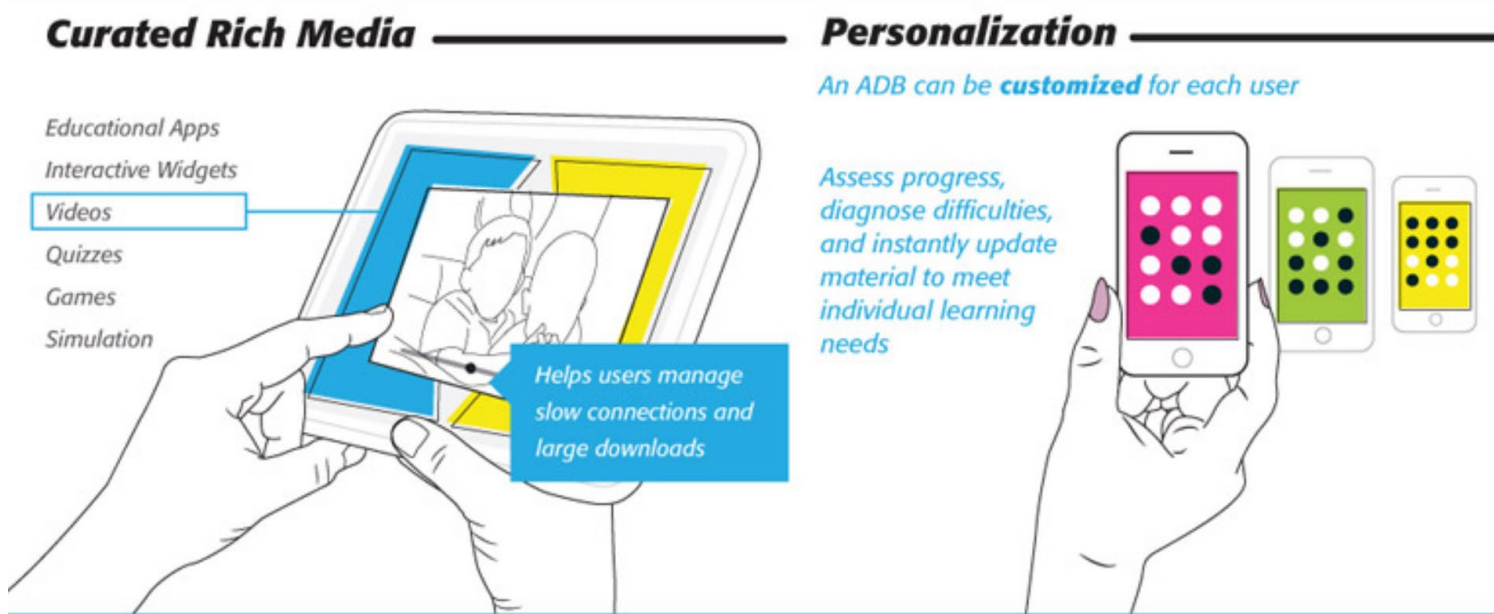
## Signal Processing

- [Sound Analysis with the Fourier Transform](#). A set of IPython Notebooks by Caleb Madrigal to explain what the Fourier Transform is and how to use it for basic audio processing applications.
- [An introduction to Compressed Sensing](#), part of [Python for Signal Processing](#): an entire book (and blog) on the subject by Jose Unpingco. [adasd](#)
- [Kalman and Bayesian Filters in Python](#). A textbook and accompanying filtering library on the topic of Kalman filtering and other related Bayesian filtering techniques.
- [Classify human movements using Dynamic Time Warping & K Nearest Neighbors](#): Signals from a smart phone gyroscope and accelerometer are used to classify if the person is running, walking, sitting standing etc. This IPython notebook contains a python implementation of DTW and KNN algorithms along with explanations and a practical application.
- [Digital Signal Processing](#) A collection of notebooks that accompanies a masters course on the topic.
- [An introduction to openCV](#) An introduction course into using openCV for computer vision in python

## Engineering Education

- [Introduction to Chemical Engineering Analysis](#) by Jeff Kantor. A collection of IPython notebooks illustrating topics in introductory chemical engineering analysis including

# Actionable Data Book



“... mobile technology, experiential analytics, and rich media, delivered through interactive eBook technology.”

<https://standards.ieee.org/develop/indconn/adb/index.html>

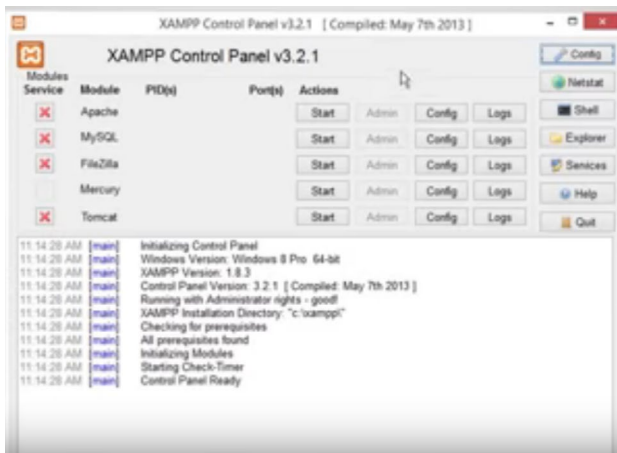
The IEEE Actionable Data Book and EPUB 3

<https://www.slideshare.net/JohnBCosta/adb-brief-for-edupub-2014>

# XAMPP



“XAMPP is a completely free, easy to install Apache distribution containing MariaDB, PHP, and Perl. The XAMPP open source package has been set up to be incredibly easy to install and to use.”



## XAMPP on a USB Stick

<https://portableapps.com/apps/development/xampp>

<https://willtan.com/installing-xampp-on-usb-flash-drive/>

<https://www.apachefriends.org/index.html>

# Spoodle

“Spoodle is an up to date portable moodle / ‘moodle on a stick’ solution for learners to access Moodle courses without requiring constant internet access.”



<https://moodle.org/mod/forum/discuss.php?d=342367>

<https://www.youtube.com/watch?v=EsHEgSYKr4A>

# Applications in Other Applications

## gRSShopper as a Firefox Sidebar

The top-left screenshot shows the Firefox Add-ons page with a search for "sidebar" resulting in 2,054 results. The search results list several add-ons, including "Gmail Mail Sidebar" and "Yandex.Bar".

The bottom-left screenshot shows the gRSShopper application interface. It features a "Loading..." message and a green grasshopper logo. The interface includes a sidebar with "Add-ons", "Tabs", and "Workers" sections. The main content area displays a list of RSS feeds and a table of links.

The right screenshot shows the gRSShopper application running as a Firefox sidebar. It displays a list of RSS feeds and a table of links. The table has columns for "Downes", "Audio", "Photos", "Social", "MLB", "Video", and "NRC".

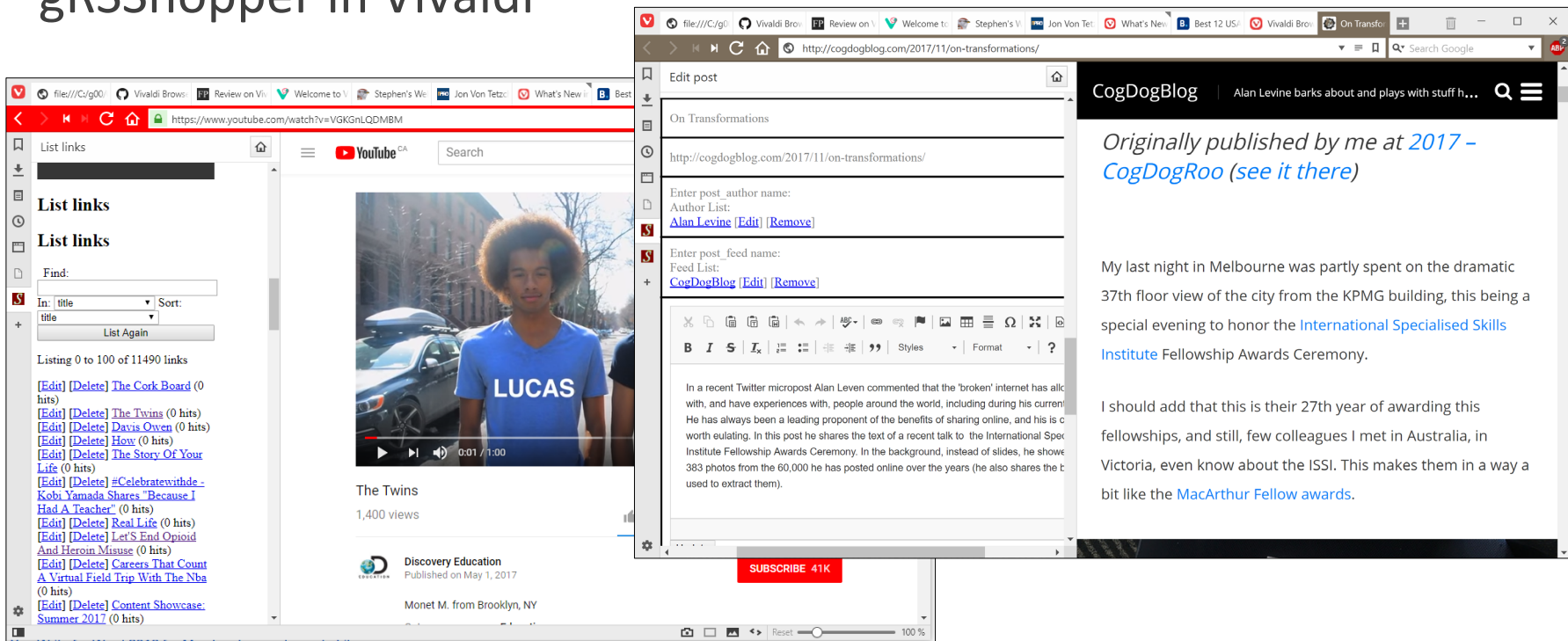
Downes	Audio	Photos	Social	MLB	Video	NRC
NewPost	Google Music	Upload	Google Plus	Games	Live - Watch	Wiki-ICT
ListPosts	CBC Radio	Albums	Medium	Scores	Live-Create	Wiki-LPSS
Presentation	Jamendo	Camera Roll	Twitter	Standings	My Channel	Zone
Pages	SoundCloud	OneDrive Photos	Twitter Activity	Blue Jays	YouTube	SAP
Admin	Ed Radio	Let's Make Art	Mastodon	Banter	Netflix	Service
Downes.ca				Jays Journal	Crave	GCcollab
Services	Travel	News	Email	Slides	Blog	Intellicur
Bank	Expedia	Weather	OWA Email	SlideShare	Half an Hour	FedScience Library

<https://addons.mozilla.org/en-US/firefox/search/?q=sidebar&platform=WINNT&appver=58.0>



# Applications in Other Applications

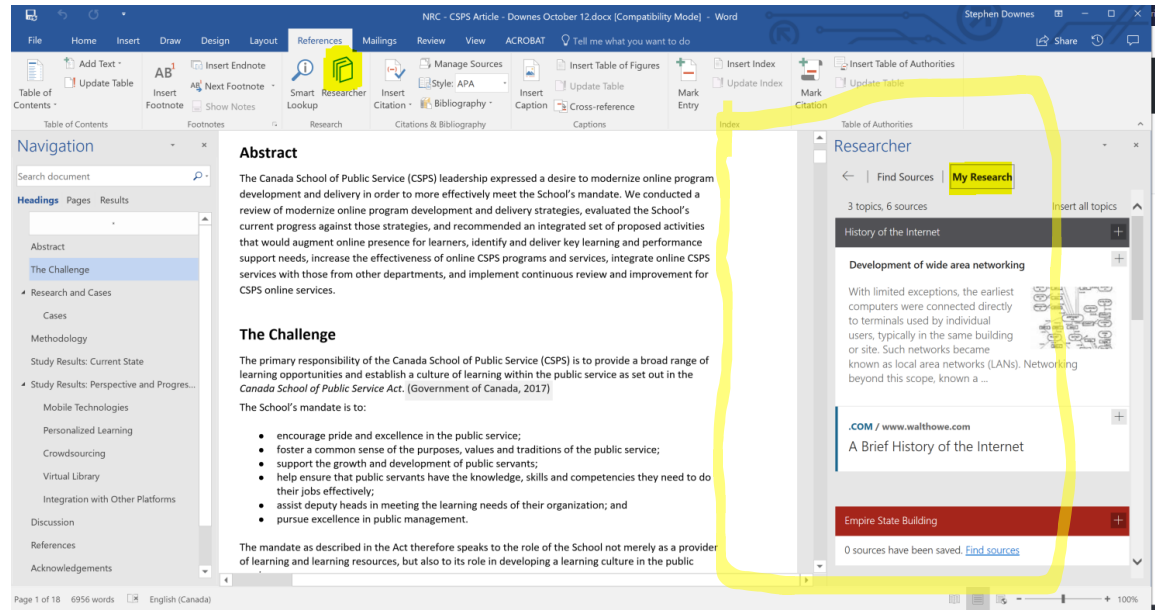
## gRSShopper in Vivaldi



<https://vivaldi.com/>

# Applications in Other Applications

## Research and References in an MS-Word Plugin



[https://www.officetooltips.com/office\\_2013/tips/advanced\\_research\\_with\\_research\\_pane.html](https://www.officetooltips.com/office_2013/tips/advanced_research_with_research_pane.html)

# Server Virtualization

Parallels -

<https://www.parallels.com/>

VMWare -

<https://www.vmware.com/>

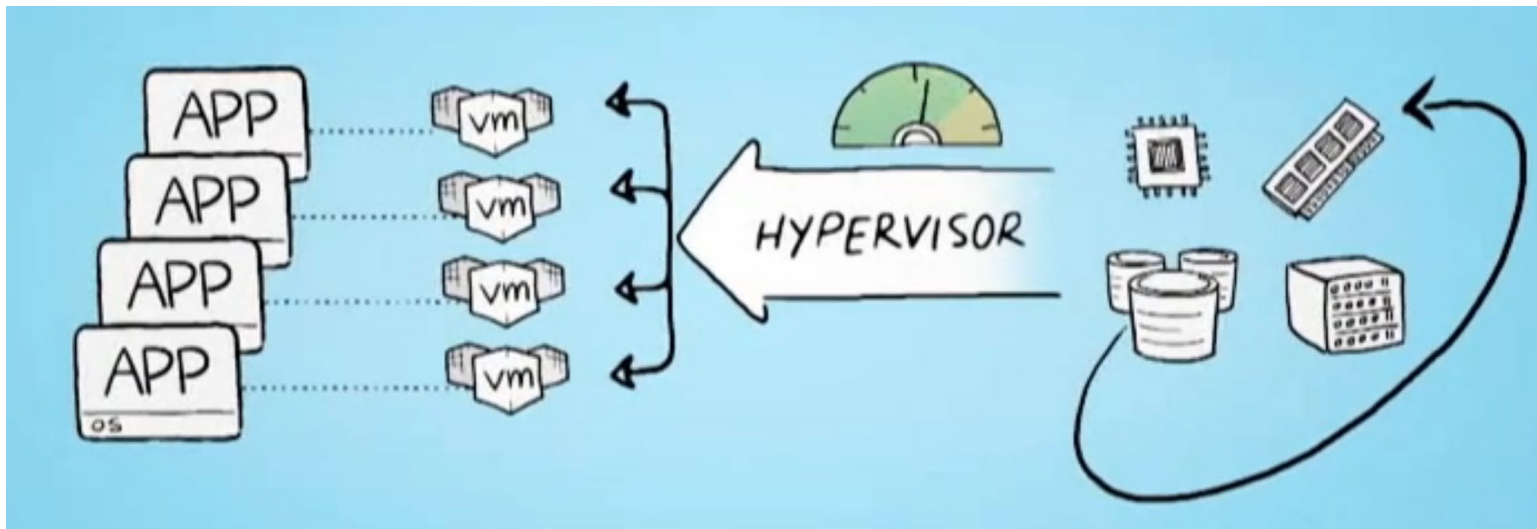
XenServer - <https://xenserver.org/>

- Virtual Box -

<https://www.virtualbox.org/>

- Hyper-V -

<https://docs.microsoft.com/en-us/virtualization/hyper-v-on-windows/quick-start/enable-hyper-v>



# Virtualization Platforms - Vagrant

```
● ● ●  
$ vagrant init hashicorp/precise64  
  
$ vagrant up  
Bringing machine 'default' up with 'virtualbox' provider.  
==> default: Importing base box 'hashicorp/precise64'...  
==> default: Forwarding ports...  
default: 22 (guest) => 2222 (host) (adapter 1)  
==> default: Waiting for machine to boot...  
  
$ vagrant ssh  
vagrant@precise64:~$ _
```



<https://www.vagrantup.com/>

# Loading and Running Vagrant

## Scotch Box

- <https://box.scotch.io/> -- <http://192.168.33.10/>
- WPDistillery - <https://wpdistillery.org/> - for WordPress

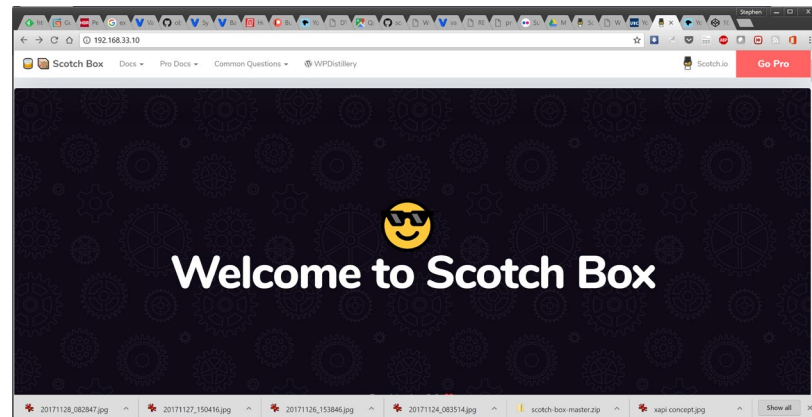
## Homestead

- Instructions - <https://laravel.com/docs/5.5/homestead#first-steps>

```
Command Prompt
Directory of C:\Users\steph\CodeProjects\Vagrant\lamp
11/27/2017 04:17 PM <DIR> .
11/27/2017 04:17 PM <DIR> ..
11/27/2017 04:17 PM <DIR> .vagrant
11/27/2017 04:17 PM 3,089 Vagrantfile
1 File(s) 3,089 bytes
3 Dir(s) 628,750,442,496 bytes free

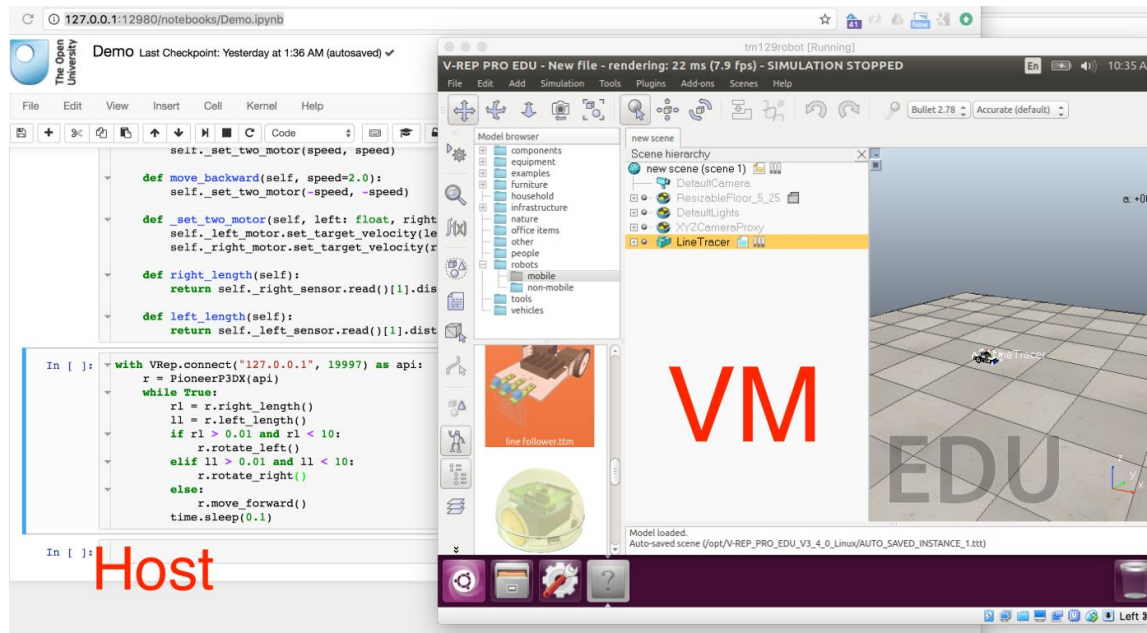
C:\Users\steph\CodeProjects\Vagrant\lamp>cd ../scotchbox

C:\Users\steph\CodeProjects\Vagrant\scotchbox>vagrant up
Bringing machine 'default' up with 'virtualbox' provider...
==> default: Box 'scotch/box' could not be found. Attempting to find and install...
default: Box Provider: virtualbox
default: Box Version: >= 0
==> default: Loading metadata for box 'scotch/box'
default: URL: https://vagrantcloud.com/scotch/box
==> default: Adding box 'scotch/box' (v3.0) for provider: virtualbox
default: Downloading: https://vagrantcloud.com/scotch/boxes/box/versions/3.0/providers/virtualbox.box
default:
==> default: Successfully added box 'scotch/box' (v3.0) for 'virtualbox'!
==> default: Importing base box 'scotch/box'...
==> default: Matching MAC address for NAT networking...
==> default: Checking if box 'scotch/box' is up to date...
==> default: Setting the name of the VM: scotchbox_default_1511952863136_42106
==> default: Clearing any previously set network interfaces...
==> default: Preparing network interfaces based on configuration...
default: Adapter 1: nat
```





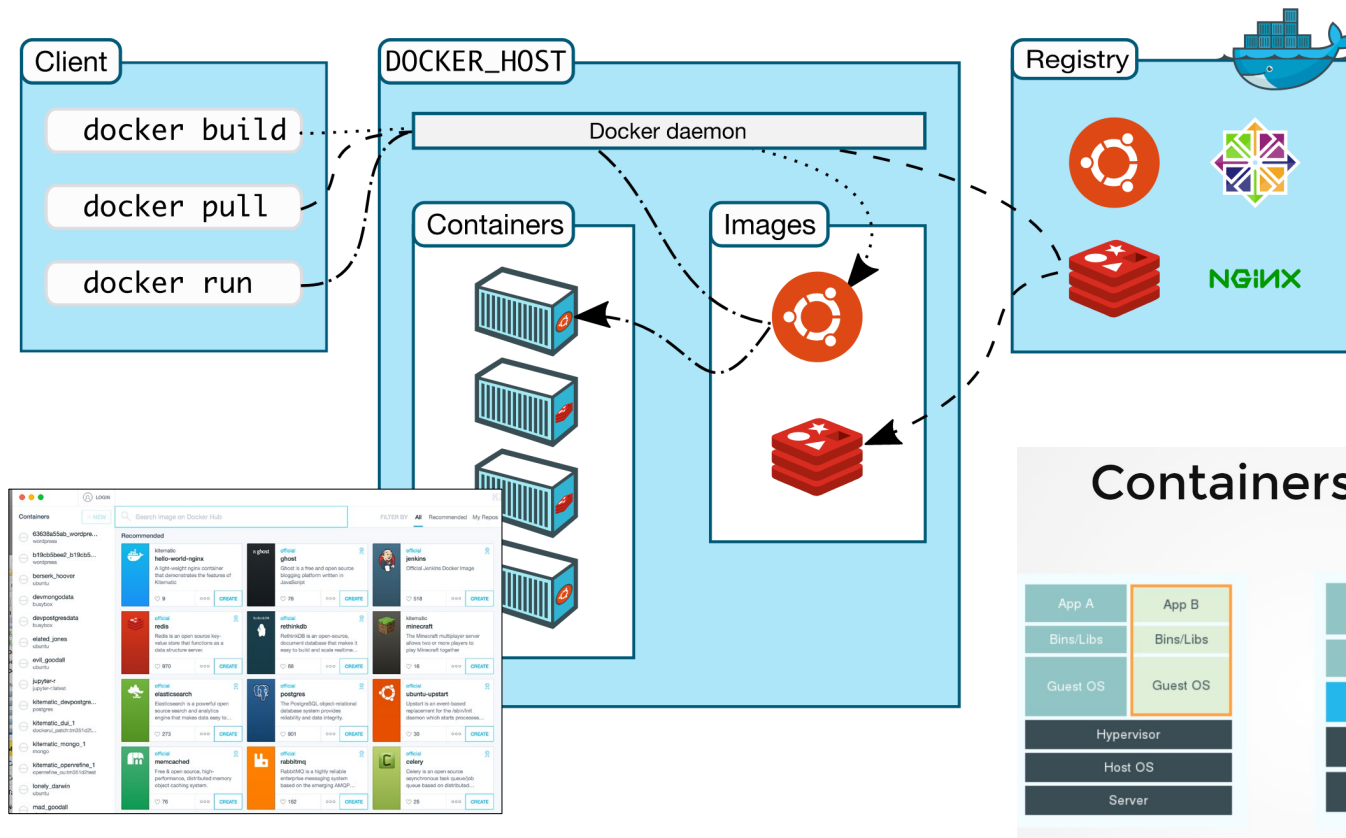
# Vagrant as Learning Environment



Distributing Virtual Machines That Include a Virtual Desktop To Students – V-REP + Jupyter Notebooks – Tony Hirst

<https://blog.ouseful.info/2017/09/10/distributing-virtual-machines-that-include-a-virtual-desktop-to-students-v-rep-jupyter-notebooks/>

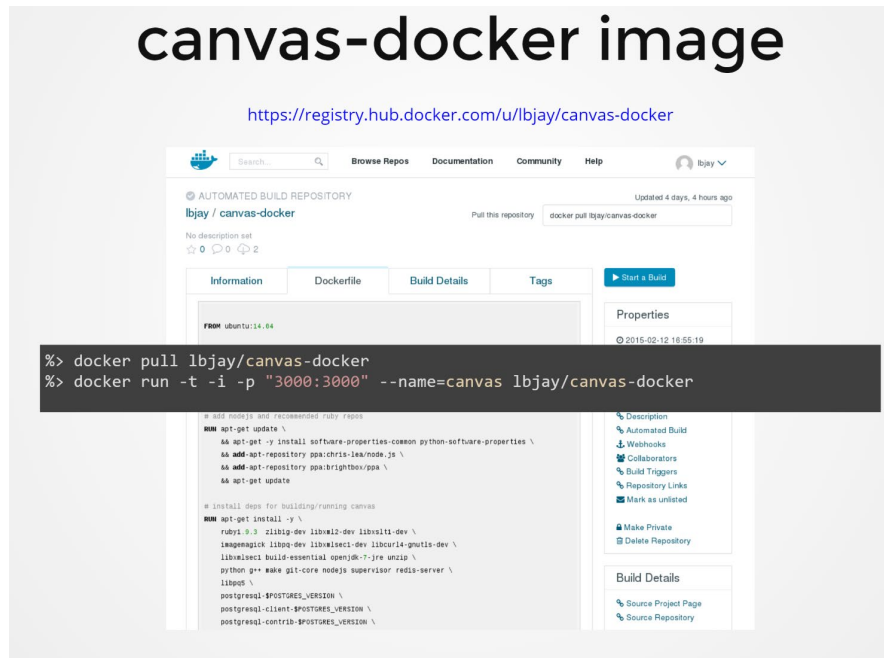
# Docker



# Canvas on Docker



[https://github.com/instructure/canvas-lms/blob/master/script/docker\\_dev\\_setup.sh](https://github.com/instructure/canvas-lms/blob/master/script/docker_dev_setup.sh)




<http://slides.com/jamesluket/how-to-docker-2#/>

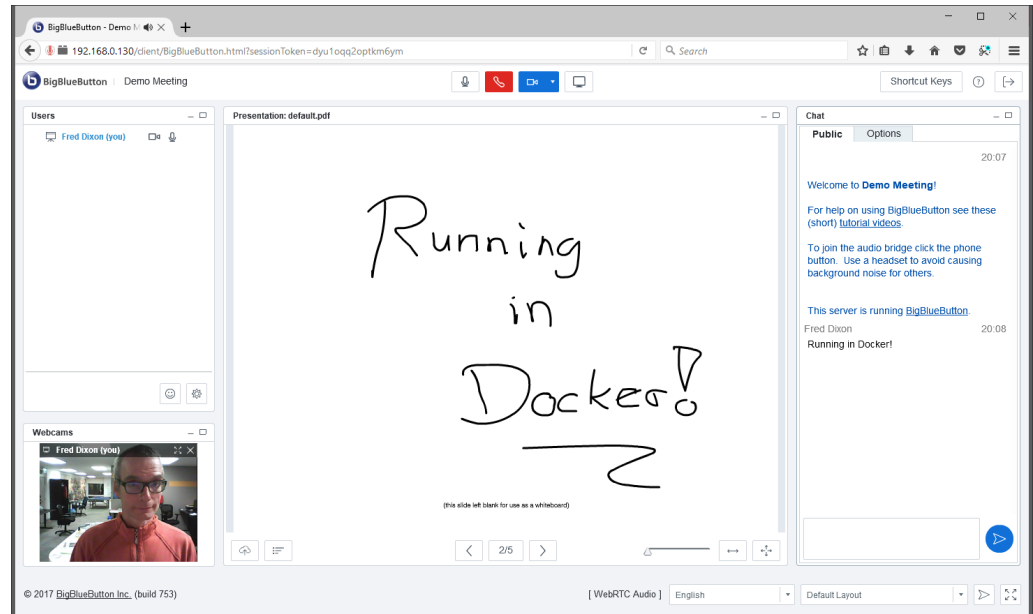
# Big Blue Button in Docker

Docker Pull Command

```
docker pull bigbluebutton/bigbluebutton
```

Owner

 bigbluebutton



<http://docs.bigbluebutton.org/labs/docker.html>

<https://hub.docker.com/r/bigbluebutton/bigbluebutton/>

# Moodle on Docker

**docker-moodle** No Maintenance Intended ×

A Dockerfile that installs and runs the latest Moodle stable.

## Installation

```
git clone https://github.com/jda/docker-moodle
cd docker-moodle
```

```
docker build -t moodle .
```

## Usage

To spawn a new instance of Moodle:

```
docker run -d --name DB -p 3306:3306 -e MYSQL_D
docker run -d -P --name moodle --link DB:DB -e M
```

You can visit the following URL in a browser to get started:


```
http://192.168.59.103:8080
```




<https://hub.docker.com/r/jauer/moodle/>




# Options

 applications cloud containers kubernetes enterprise support

## Launch Moodle now



[Launch Moodle using docker](#)  
Recommended if you're getting started with using containers on your workstation or laptop.



[Launch Moodle using Kubernetes](#)  
Recommended if you want to deploy your application on production infrastructure.

<https://bitnami.com/stack/moodle/containers>

# Cloud Infrastructure Providers



AWS – Amazon -  
<https://aws.amazon.com/>



Azure – Microsoft -  
<https://azure.microsoft.com>



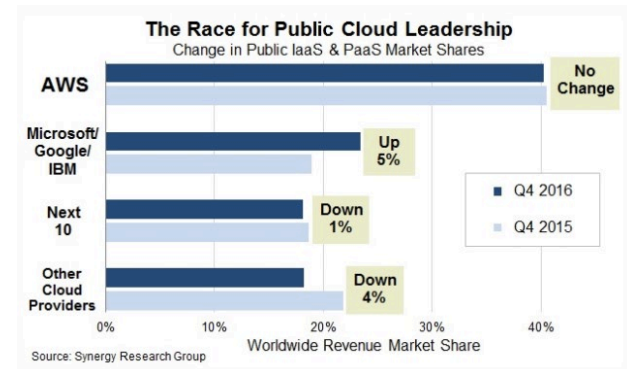
Bluemix – IBM Cloud -  
<https://www.ibm.com/cloud/>



Google Cloud Platform -  
<https://cloud.google.com/>




Oracle Cloud - <https://cloud.oracle.com/>




<https://www.srgresearch.com/articles/microsoft-google-and-ibm-charge-public-cloud-expense-smaller-providers>

# Cloud Computing for Education




How To Buy Cloud

[Learn More »](#)



AWS PUBLIC SECTOR  
SUMMIT  
Washington DC


[View Keynotes & Sessions »](#)



**Higher Education**

From data center migration to student data and analytics, AWS has agile and flexible solutions.


[Learn more »](#)



**K12 & Primary Schools**

Streamline district IT operations, save money, and keep student information safe in the AWS Cloud.

[Learn more »](#)



**Ed Tech Companies**

Innovate and build the next generation of online learning, analytics, and campus management solutions.

[Learn more »](#)



**coursera**

**echo**<sup>360</sup>  
active learning



Amazon Web Services - <https://aws.amazon.com/education/>

# OER and Virtualization

## Open Distribution of Virtual Containers as a Key Framework for Open Educational Resources and STEAM Subjects

Alberto Corbi and Daniel Burgos

<http://www.ejel.org/issue/download.html?idArticle=575>

“Unikernels represent and deeper simplification of the virtual container approach, given that all necessary computing elements (operative system kernel, basic libraries, frameworks, drivers, scientific application, etc.)”

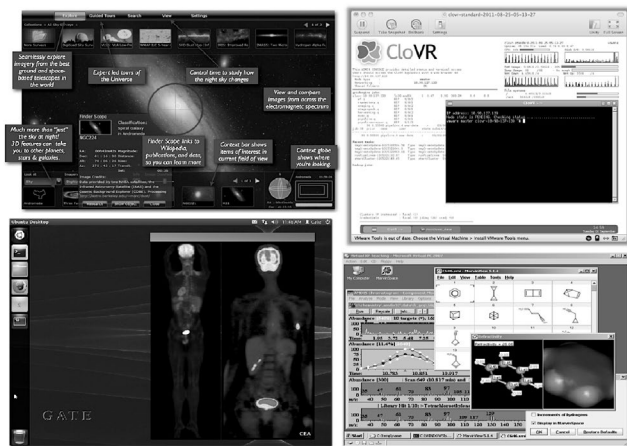


Figure 3: Some educational resources that are distributed as classic virtual machines (WWT, CloVR, vGATE, and a VirtualBox image for chemistry teaching).

# Mobile Authoring for ARLearn

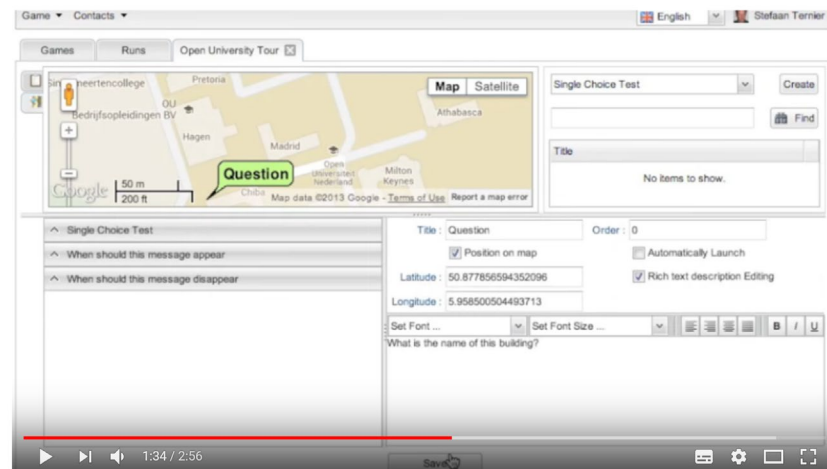
“The Mobile Authoring Tool complements the ARLearn desktop-based environment. Hence, a mobile game author can wander around creating items and synchronizing real world artefacts with game content.”

[https://dspace.ou.nl/bitstream/1820/5674/1/UAIS\\_Tabuenca\\_2014.pdf](https://dspace.ou.nl/bitstream/1820/5674/1/UAIS_Tabuenca_2014.pdf)

Bernardo Tabuenca; Marco Kalz;  
Stefaan Ternier; Marcus Specht

## ARLearn <http://ar-learn.com/>

ARLearn is a technical framework for creating mobile serious games



<https://www.youtube.com/watch?v=Lqk3yrcNjNI>

# Interaction and Access Data

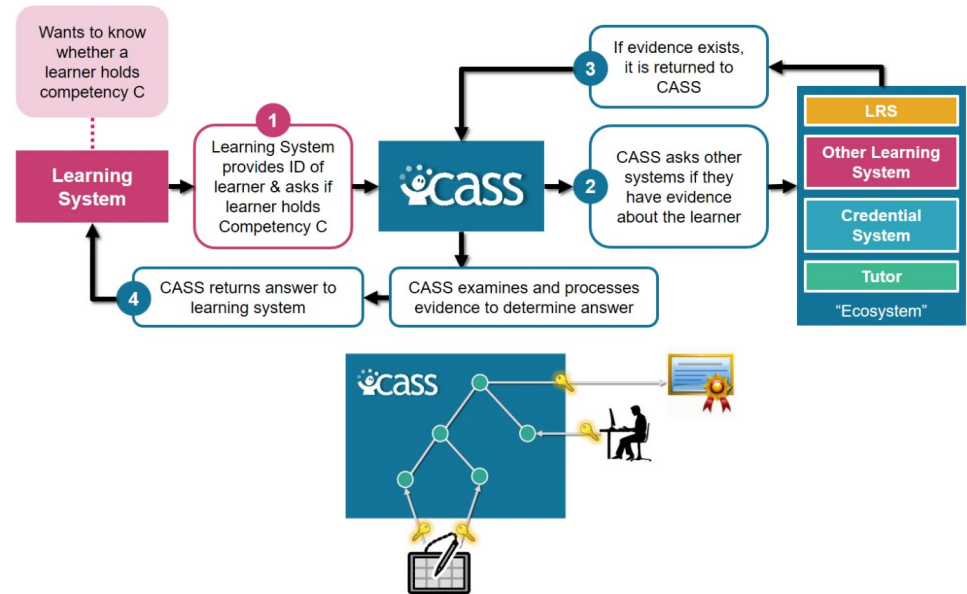
## Unlocking Open Educational Resources (OERs)

Interaction Data - David Massart, Elena Shulman

- <http://www.dlib.org/dlib/may13/massart/05massart.html>

## Creativity in the Open Workshop

- <http://blogs.ubc.ca/chendricks/>



## Advanced Distributed Learning (ADL):

- Competencies and Skills Systems
- Experience API (xAPI)

<https://www.adlnet.gov/xapi/>



# Happening Now...

Docker images to build OER

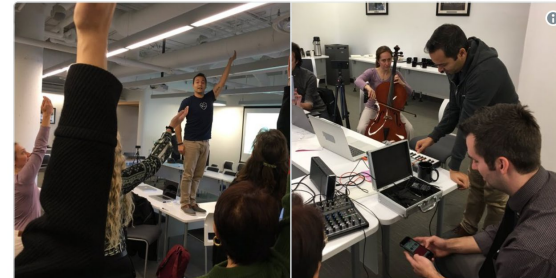
- <https://gitlab.com/oer/docker>

Creativity in the Open Workshop

- <http://blogs.ubc.ca/chendricks/>

Uhack Weekend (Tasmania)

- <http://uhack-guide.readthedocs.io/en/latest/resources/project-hosting/>
- <https://uhack-tasmania-2017.devpost.com/>



**Brian Lamb**  
@brlamb



Things be a bit odd at #cito17

5:54 PM - Oct 24, 2017



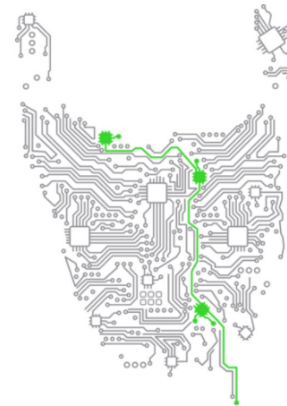
2



3



14



# Thank You



<http://www.downes.ca>