

UNIVERZITET DŽEMAL BIJEDIĆ U MOSTARU
FAKULTET INFORMACIJSKIH TEHNOLOGIJA MOSTAR

SEMINAR

OSS e-commerce rješenje sa sistemom preporuke

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1. Uvod

Cilj ovog seminarskog rada je implementirati webshop rješenje čije su komponente isključivo open source (nadalje OSS) software-a

Firma "bring.out", implementator sistema je bosanski OSS IT provajder.

Kompletan portfolio firme je baziran na OSS-u, tako da i ovo rješenje treba zadovoljiti kriterije otvorenosti izvornog koda.

2. Analiza dostupnih OSS komponenti za gradnju rješenja

2.1. Sistemi preporuke

Najpoznatiji OSS sistemi preporuke su:

- *easyrec*¹
- *Apache mahout*²
- *Lenskit recommender framework*³

Apache mahout je projekat koji ima reputaciju najkopletnijeg i najkompleksnijeg "recommendation engine"-a

Postoji odična integracija sa drugim projektom popularnim "Apache fondacije" - *hadoop-om*⁴ koji se koristi u za distribuiranu obradu "big data"⁵.

Sva tri pomenuta rješenja su implementirana u programskom jeziku Java.

Lenskit je najmlađi projekat, ali ima veoma aktivnu zajednicu korisnika i programera (eng. "community").

Easyrec je započeo kao komercijalni projekat austrijske firme "Studio Smart Agent Technologies". Naknadno je objavljen kao OSS pod GPLv3 licencom. Dobio je više nagrada za inovaciju na području web-a i multimedije⁶. *Easyrec* je java aplikacija koja sa webshop rješenjima komunicira putem web servisa (REST ili SOAP), tako da je moguća integracija sa bilo kojim third-party sistemom. Sadrži kvalitetan web administrativni interfejs izdvaja od konkurentskih rješenja.

¹<http://easyrec.org/>

²<http://mahout.apache.org/>

³<http://lenskit.grouplens.org/>

⁴<http://hadoop.apache.org>

⁵velike količine podataka, najčešće korišteno u rješenjima "data-mining" sistema

⁶<http://en.wikipedia.org/wiki/Easyrec>

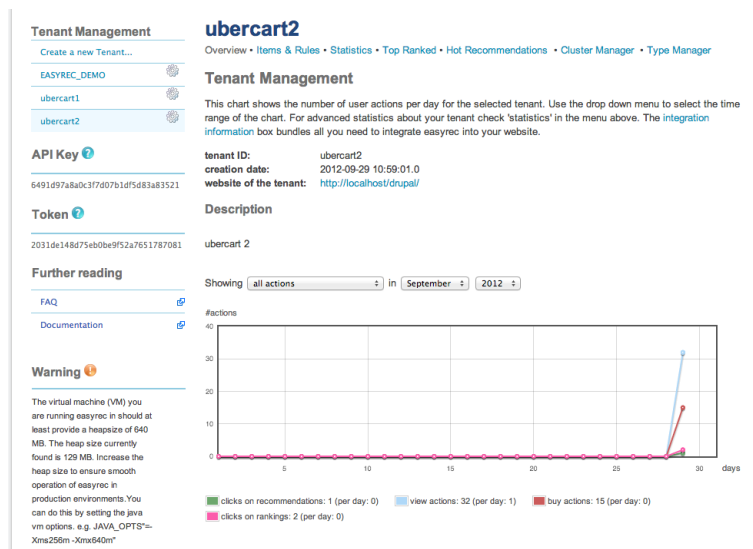


Figure 2.1: Easyrec web interfejs

2.2. Web shop rješenje

Postoji niz OSS rješenja. Međutim, sa stanovišta proširivosti, "drupal"⁷ bazirana rješenja su najpopularnija.

2.2.1. Drupal web content framework

Drupal je "web content framework" napisan u programskom jeziku PHP.

Često se navodi i da je drupal "CMS"⁸ software, međutim framework je definitivno bolji opis drupal-a.

Drupal je razvojna platforma za različite web sadržaje.

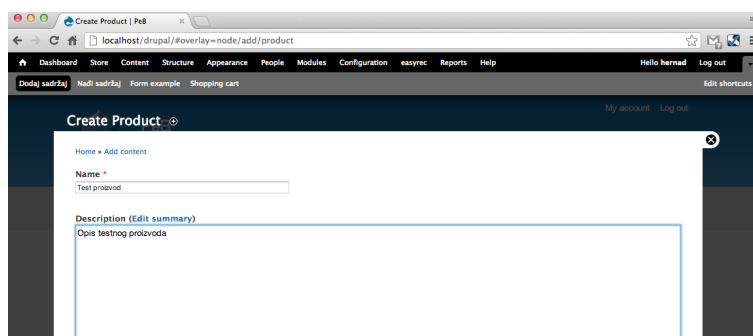


Figure 2.2: Drupal web interfejs dodavanje sadržaja (content)

⁷<http://www.drupal.org>

⁸CMS - Content Management System

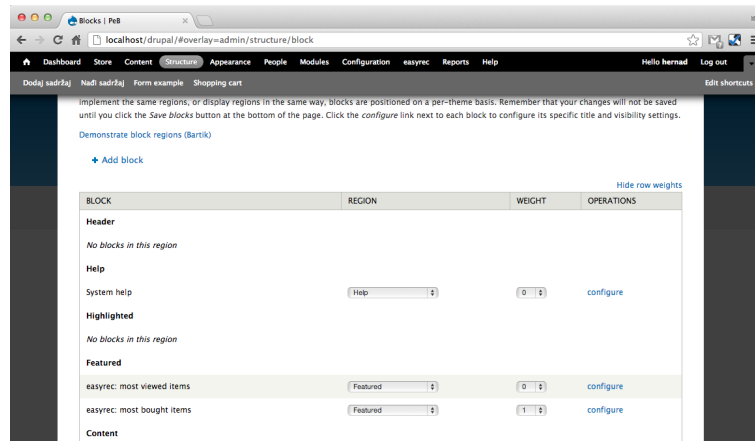


Figure 2.3: Drupal web interfejs - podešanje strukture prikaza (blocks)

2.2.2. OSS E-commerce rješenja

Na tržištu postoji više OSS aktivnih drupal e-commerce projekata:

- drupal commerce⁹
- ubercart¹⁰

"Drupal comerce" je relativno mlad projekat, ali je vrlo brzo stekao vidljivost na tržištu OSS e-commerce rješenja.

Započeli su ga bivši developer "ubercart"-a, koji je opet prvo "ozbiljno" OSS e-commerce rješenje.

Web stranice prokejkta ukazuju da se radi o ozbiljnom projektu sa jakom finansijskom podrškom:

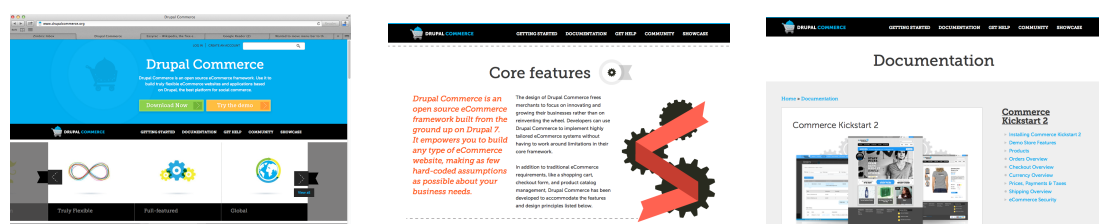


Figure 2.4: Drupal commerce web site

Filozofija razvoja drupal commerce-a je slična razvoju samog drupala. Drupal-commerce je core sistem za nove e-commerce distribucije koje su bazirane na njemu. Source code je GPLv2 licenciran kao i sam drupal.

⁹<http://www.drupalcommerce.org>

¹⁰<http://www.ubercart.org>

Ubercart je svojevrsni "veteran" drupal baziranih e-commerce rješenja. *Ubercart* v2.x (baziran na drupal 6.x) je vrlo zastupljen e-commerce sistem.

2.2.3. Integracijska komponenta (e-commerce <-> sistem preporuke)

Posljednja komponenta u konstrukciji zadanog sistema je integracijska komponenta e-commerce <-> recommender.

Ubercart ima riješenu integraciju sa *easyrec*-om kao poseban drupal projekat¹¹

2.3. Odabir komponenti

Easyrec se svojom jednostavnošću i fleksibilnošću odmah nametnuo kao dobar izbor za komponentu koja će biti sistem preporuke. Kako za njega postoji i integracijska komponenta sa *ubercart*-om konačan izbor sistema je:

1. drupal 7.x
2. *ubercart* 3.x
3. *easycart* 0.97
4. *easyrec_for_ubercart*

¹¹http://drupal.org/project/easyrec_for_ubercart

3. Instalacija

3.1. Bazno okruženje

3.1.1. XAMPP PHP, Mysql database server

Drupal instaliramo unutar XAMPP stack-a¹ za Mac OS X 1.7.3 (MySQL 5.1.x, PHP 5.3.x)

Apache web server web root:

```
/Applications/XAMPP/htdocs
```

3.1.2. Easyrec web aplikacija

Easyrec je stanardna J2EE² web aplikacija (WAR), tako da za njegovu instalaciju trebamo J2EE aplikacijski server.

Preporučeni server je tomcat. Instaliramo tomcat, kopiramo easyrec-web.war (ver. 0.97)³ u deployment direktorij tomcat servera i na kraju pokrećemo server:

```
1) ~/FIT/PeB/apache-tomcat-7.0.30$ cp ~/Downloads/easy-rec.war ↵
webapps/

2) ~/FIT/PeB/apache-tomcat-7.0.30/bin/$ ./catalina.sh start

> Using CATALINA_BASE: /Users/hernad/FIT/PeB/apache-tomcat-7.0.30
> Using CATALINA_HOME: /Users/hernad/FIT/PeB/apache-tomcat-7.0.30
> Using CATALINA_TMPDIR: /Users/hernad/FIT/PeB/apache-tomcat↵
-7.0.30/temp
> Using JRE_HOME: /System/Library/Frameworks/JavaVM.framework/↵
Versions/CurrentJDK/Home
```

¹<http://www.apachefriends.org/en/xampp.html>

²java enterprise edition

³download sa sourceforge repozitorija <http://sourceforge.net/projects/easyrec/files/>

```
> Using CLASSPATH: /Users/hernad/FIT/PeB/apache-tomcat-7.0.30/bin/↵
bootstrap.jar:/Users/hernad/FIT/PeB/apache-tomcat-7.0.30/bin/↵
tomcat-juli.jar
```

Pokrećemo u browseru

```
http://localhost:8080/easyrec-web
```

prolazimo kroz jednostavni install proces koji u easyrec bazu⁴

Na kraju dobijamo dolazimo na login našeg sistema preporuke:

3.1.3. Kreiranje drupal i easyrec baza

```
/Applications/XAMPP/xamppfiles$ bin/mysql -u root
mysql> create database ubercart3;

> Query OK, 1 row affected (0.07 sec)

mysql> create database easyrec;

mysql> quit
```

3.1.4. Drupal

Drupal core 7.1.15 sa svim potrebnim podmodulima nalazi se na hernad github repozitoriju.

Izvršimo kloniranje repozitorija i njegovih podmodula:

```
1) /Applications/XAMPP/htdocs$ git clone git@github.com:hernad/↵
drupal.git

> Cloning into 'drupal'...

/Applications/XAMPP/htdocs$ cd drupal

2) /Applications/XAMPP/htdocs/drupal$ git submodule init

> Submodule 'sites/all/modules/easyrec_for_ubercart' (git@github.↵
com:hernad/easyrec_for_ubercart.git) registered for path 'sites↵
/all/modules/easyrec_for_ubercart'
> Submodule 'sites/all/modules/jcarousel' (git@github.com:hernad/↵
jcarousel.git) registered for path 'sites/all/modules/jcarousel↵
'
```

⁴koju ranije trebamo kreirati, vidi donji korak "Kreiranje easyrec baze"

```

> Submodule 'sites/all/modules/ubercart' (git@github.com:hernad/↵
  ubercart.git) registered for path 'sites/all/modules/ubercart'

3) /Applications/XAMPP/htdocs/drupal$ git submodule update

> Cloning into 'sites/all/modules/easyrec_for_ubercart'...
> ...
> Submodule path 'sites/all/modules/easyrec_for_ubercart': checked↵
  out '26a96e622be0acee012c4cff85b3e8e4f87cd5e5'
> Cloning into 'sites/all/modules/jcarousel'...
> ....
> Submodule path 'sites/all/modules/jcarousel': checked out '↵
  ef51d00eae77e354c771cf595621971f5f250ac2'
> Cloning into 'sites/all/modules/ubercart'...
> ...
> Submodule path 'sites/all/modules/ubercart': checked out '↵
  e5a4154d8a9fdf6483fabd7e851798f3c88fd623'

```

Poděšenje drupal config fajlova:

```

/Applications/XAMPP/htdocs/drupal/sites$ cp example.sites.php ↵
  sites.php
/Applications/XAMPP/htdocs/drupal/sites$ chmod a+w sites.php
/Applications/XAMPP/htdocs/drupal/sites$ mkdir -p default/files
/Applications/XAMPP/htdocs/drupal/sites$ chmod a+w default/files
/Applications/XAMPP/htdocs/drupal/sites$ cd default
/Applications/XAMPP/htdocs/drupal/sites/default$ cp default.↵
  settings.php settings.php
/Applications/XAMPP/htdocs/drupal/sites/default$ chmod a+w ↵
  settings.php
/Applications/XAMPP/htdocs/drupal/sites/default$ cd ..

```

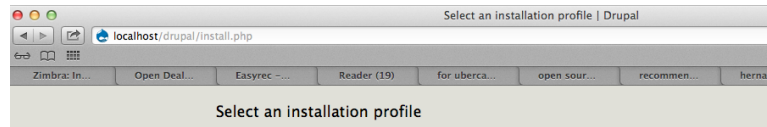


Figure 3.1: Drupal install step 1

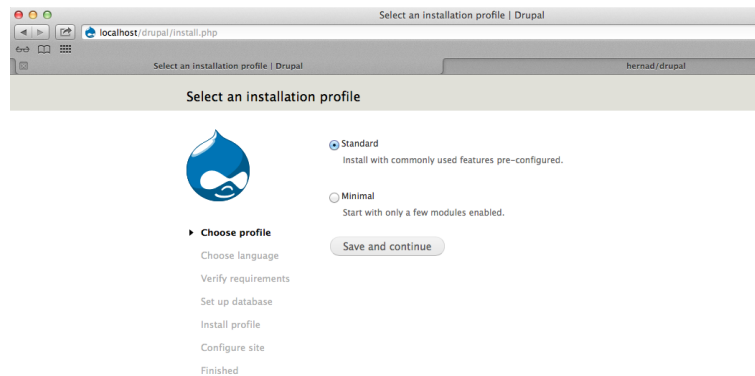


Figure 3.2: Drupal install step 2

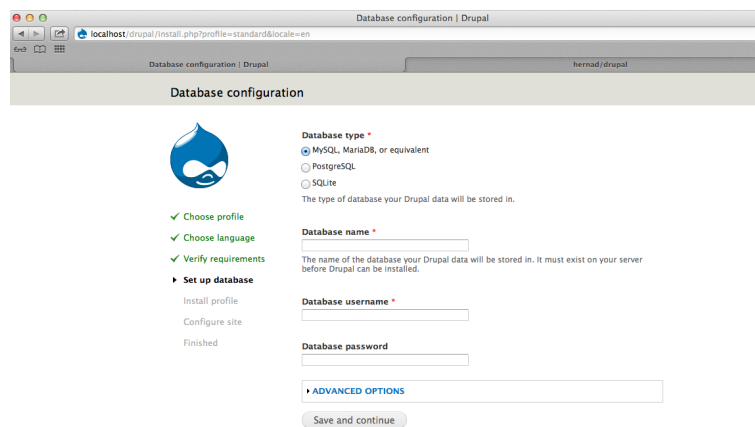


Figure 3.3: Drupal install step 3



Figure 3.4: Drupal install step 4

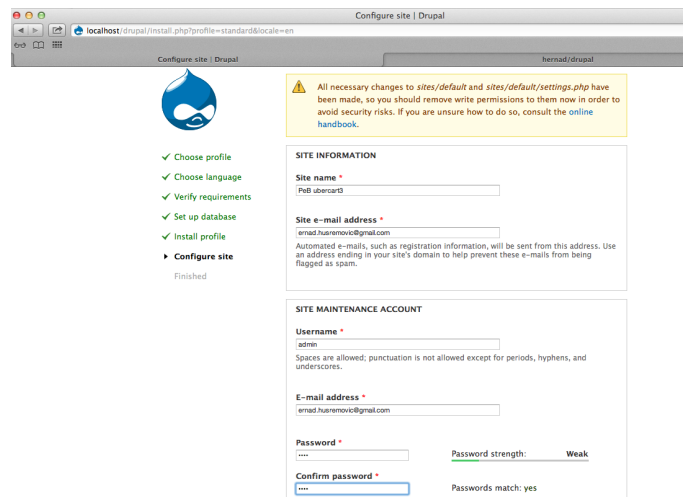


Figure 3.5: Drupal install step 5

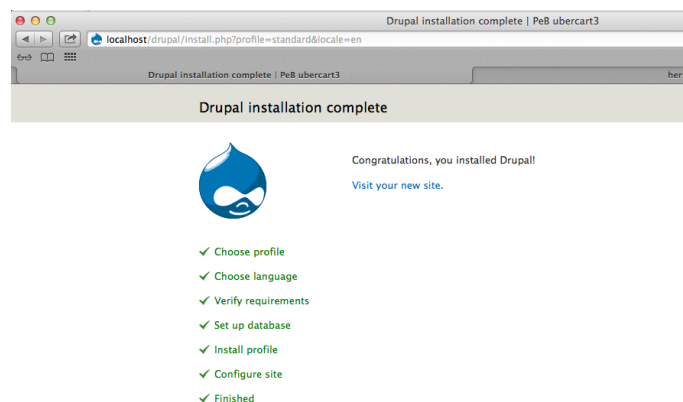


Figure 3.6: Drupal install step 6

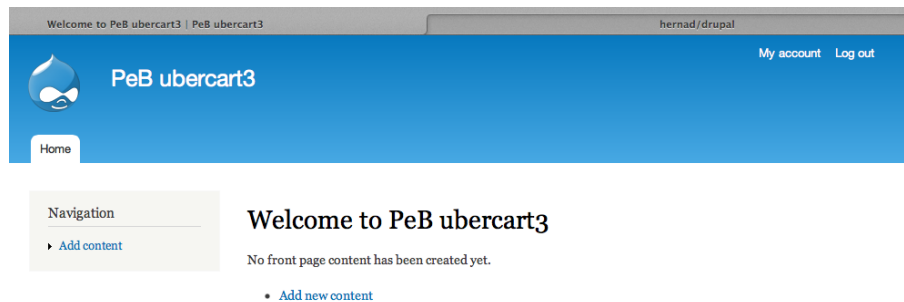


Figure 3.7: Drupal install - napokon "welcome" :)

3.1.5. Aktivacija drupal modula za ubercart i easyrec

1. locale
2. chaost-tools
3. easyrec
4. rules
5. cart
6. store
7. order
8. product
9. views
10. views-ui

3.1.6. Podešenje drupal blokova za prikaz ubercart i easyrec elemenata

Prikaz sadržaja na drupal stranicama se podešava unutar admin interfejsa.

Mi želimo na "featured" sekciju (vrh web stranice) staviti prikaz najviše kupovanih i najviše gledanih artikala u toku dana⁵

⁵Podešavamo dnevnu statistiku u testnom okruženju zato što se ona najprije ažurira

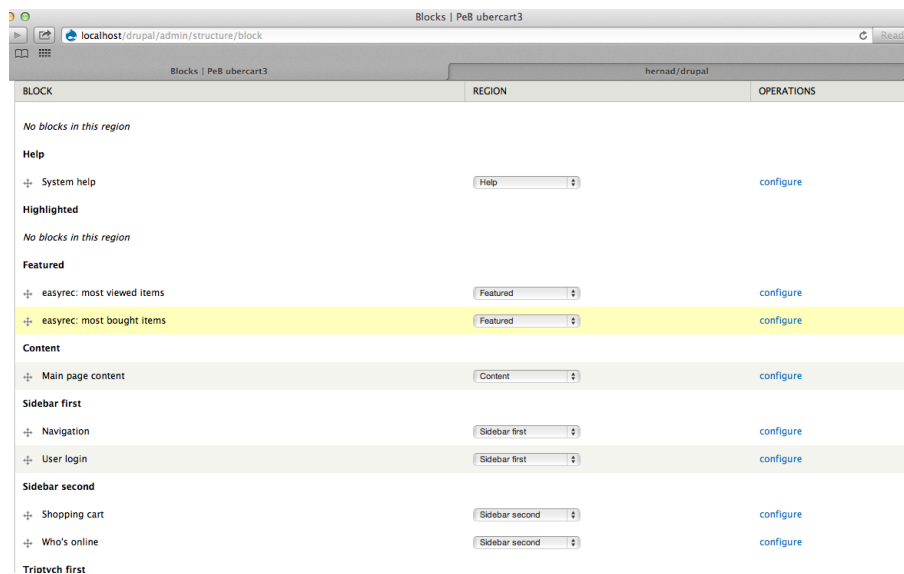


Figure 3.8: Drupal block config

Ovako podešavamo prikaz najviše kupovanih artikala:

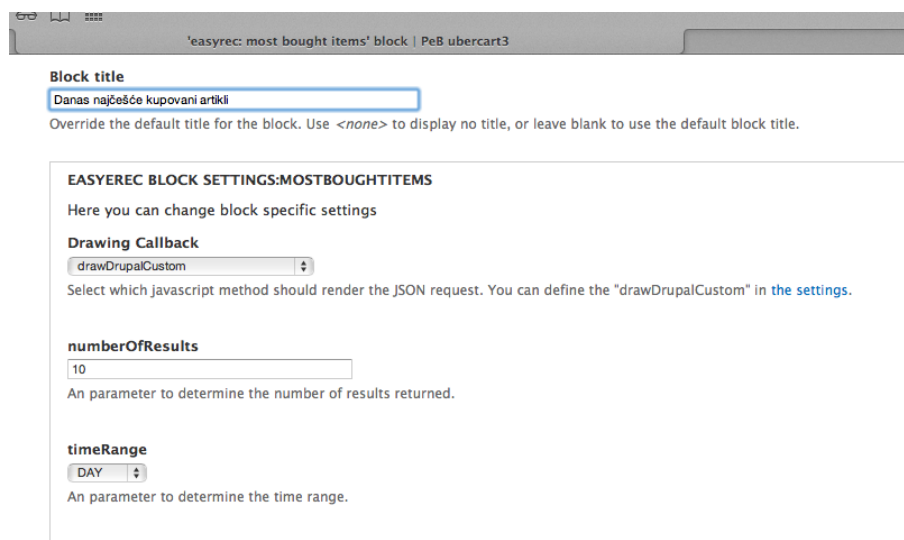


Figure 3.9: Konfiguracija drupal blokova - prikaz sistema preporuke


Analogno se podešava i prikaz artikala koje su korisnici najviše pregledali.

3.1.7. Podešenje komunikacije ubercart - easyrec server

Dodajmo jedan "tenant" u easyrec⁶

⁶Inače tenant je u prevodu sa engleskog "stanar". U kontekstu easyrec-a, tenant je e-commerce aplikacije koju monitorišemo.

Integration Information


Your tenant was created successfully! Now you can use your tenant ID and the API key to send actions to the easyrec service.

Please select the appropriate tab fitting the technology you use for integrating easyrec

Plugins

JS API

REST API

If you use a plugin or module to integrate easyrec into your website please read the documentation of your plugin/module to get started. Every plugin will most likely ask you for these three things to configure in your application:

easyrec Api Key:
6491d97a8a0c3f7d07b1df5d83a83521

easyrec tenantId:
ubercart3


easyrec URL:
`http://localhost:8080/easyrec-web/`

Figure 3.10: Kreiranje novog tenanta ubercart3

Povezivanje drupala sa easyrec tenant-om "ubercart3":

Home » Administration

easyrec


The configuration options have been saved.

easyrec is a free (registration required) recommender service. Configure the required parameters to get started.

EASYREC SETTINGS

To get started go to the [easyrec webpage](#) and register a user so you can create a tenant and get an API key. Alternatively, you can also [run your own easyrec server](#).

easyrec Api Key *

6491d97a8a0c3f7d07b1df5d83a83521

Your API key allows you to access easyrec services. If you dont have an API key you can obtain one from the [easyrec webpage](#) or your own server's admin tool.

easyrec tenantId *

ubercart3

The easyrec tenant id identifies your shop. Note: You can have multiple shops with the same API key. If you dont have a tenant id you can obtain one from the [easyrec webpage](#) or your own server's admin tool.

easyrec URL *

http://localhost:8080/easyrec-web/

Just change this value if you [installed your own easyrec server](#). If you are not sure what this is use "http://demo.easyrec.org:8080/".

Figure 3.11: podešenje drupal easyrec modula

Nakon ovog podešenja, na easyrec web konzoli uočavamo da sistem bilježi "view" i "buy" akcije.

4. Korištenje sistema

4.1. Definisanje artikla - proizvoda



Figure 4.1: Dodavanje novog proizvoda / 1

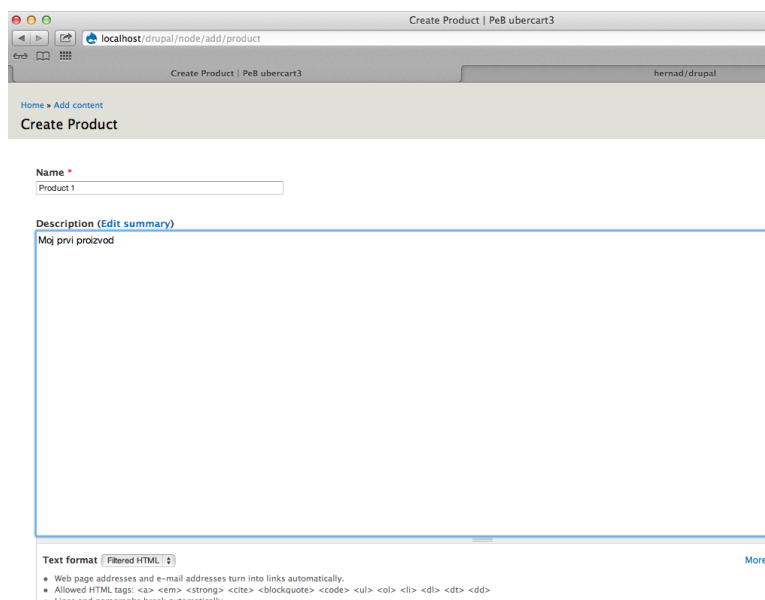


Figure 4.2: Dodavanje novog proizvoda / 2

Create Product / PeB ubercart3 bernad/drupal

Product information
SKU: 00001, Sell price: \$2, Shippable

Revision information
No revision

Authoring information
By admin

Publishing options
Published, Promoted to front page

SKU *
00001
Product SKU/model.

List price **Cost** **Sell price ***
\$ 1 \$ 0.1 \$ 2
The listed MSRP. Your store's cost. Customer purchase price.

☒ Product is shippable.

Weight **Units**
0 Kilograms

Length **Width** **Height** **Units**
0 0 0 Centimeters

Maximum package quantity *
1
At most, how many of these items can fit in your largest box? Orders that exceed this value will be split into multiple packages when retrieving shipping quotes.

List position
0
Specify a value to set this product's position in product lists. Products in the same position will be sorted alphabetically.

[Save](#) [Save and continue](#) [Preview](#)

Figure 4.3: Dodavanje novog proizvoda / 3

Na kraju, proizvod se prikazuje na naslovnoj stranici našeg web-shopa:

Product 1 | PeB ubercart3 bernad/drupal [My account](#) [Log out](#)

[Home](#)

☒ Product Product 1 has been created.

[Home](#)

Navigation
Add content

Product 1
[View](#) [Edit](#)

Submitted by [admin](#) on Fri, 10/05/2012 - 20:00

SKU: 00001 **\$2.00**

Moj prvi proizvod

Image:
P1

List price: \$1.00
Cost: \$0.10
Price: \$2.00

Figure 4.4: Dodavanje novog proizvoda / 4

4.2. Prodaja artikala

Prodaja artikala unutar uberchart webshop rješenja je krajnje jednostavna. Klik na dugme proizvoda i korpa kupca se puni:

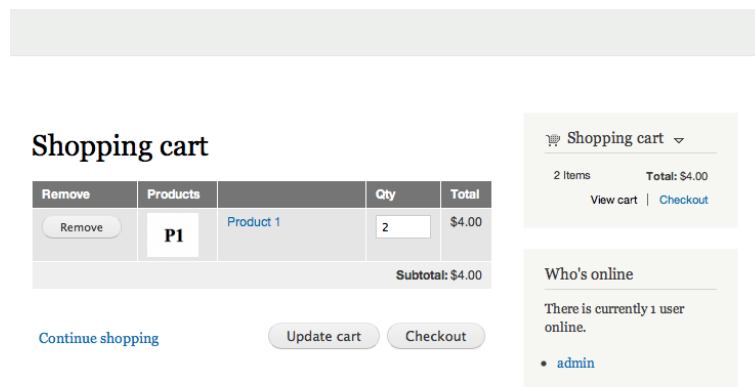


Figure 4.5: Potrošačka korpa "kupca"

Preporuka kupcima

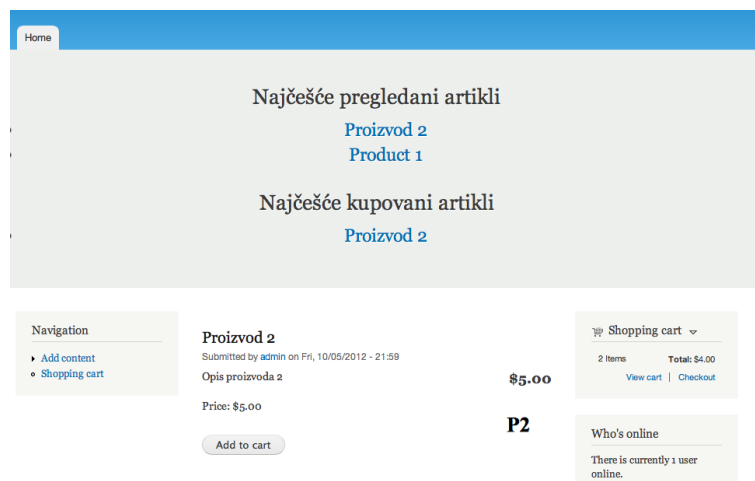


Figure 4.6: Preporuka - informacije o najposjećivanijim i najviše kupovanim artiklima

5. Sistem preporuke

5.1. Sistemi preporuke općenito

Količina informacije koje internet korisnici dobijaju se stalno povećava. To za posljedicu ima sve teže i teže nalaženje relevantnih informacija. Zato su tehnike filterisanja relevantnih informacija dobile na velikoj važnosti. Set algoritama koji nastoje riješiti taj problem nazivaju se sistemi za kolaborativno filterisanje, odnosno sistemi preporuke (eng. CF - Collaborative Filtering recommender systems). CF algoritmi pohranjuju akcije koje pojedini korisnici vrše nad artiklima. Ovi podaci se onda koriste da se generišu grupacije ("susjedstva") sličnih artikala ili korisnika sa pretpostavkom da korisnik koji preferira iste stvari (proizvode, usluge) kao i korisnici koji su u bliskom susjedstvu sa njim (Marshik)

5.2. Easyrec sistem preporuke

Easyrec¹ je cjelovito rješenje sistema preporuke.

On kombinuje više algoritama za rangiranje artikala, te na osnovu njih davanje preporuke korisnicima sistema.

Easyrec ima sopstvenu bazu artikala prema kojoj vrši proračune. Ona prima podatke o akcijama korisnika nad pojedinim artiklima unutar e-commerce sistema, procesira ih putem algoritama preporuke, te korisnicima vraća rezultat u obliku rang-lista po više različitih kriterija.

Na njihovoj web stranici² <http://easyrec.org> stoji:

easyrec is:

- easy to use - personalize your application within minutes
- easy to integrate - due to plugins, a REST API or placing javascript codesnippets in your web pages.

¹<http://en.wikipedia.org/wiki/Easyrec>

²`\unskip\penalty\@M\vrulewidth\z@height\z@depth\dp,`

- easy to scale - due to distributed architecture
- easy to maintain - with the included management application
- easyrec is OPEN SOURCE and FREE!

Može se reći da su većinu od ovih "easy" obećanja uspjeli postići.

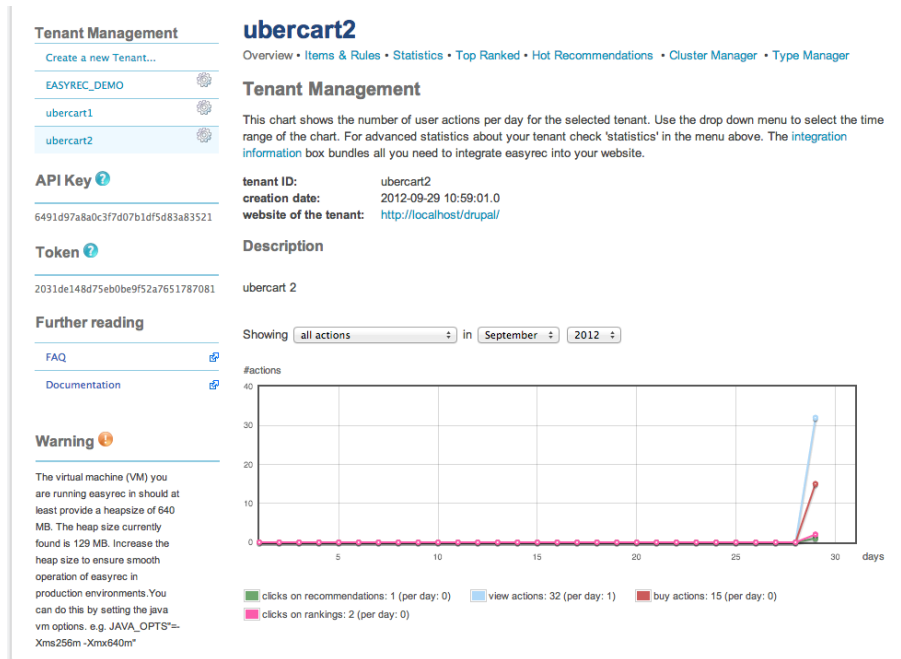


Figure 5.1: Easyrec "tenant" ubercart2

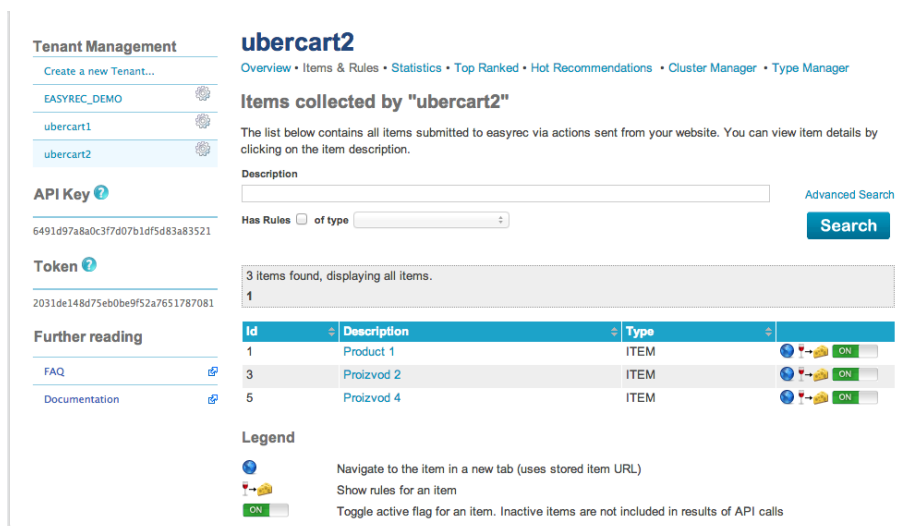


Figure 5.2: Easyrec "items" koje "tenant" ubercart2 bilježi

Proizvod 4

EditDetailsRulesStatistics

Here you find some details about the selected item. Use the Edit tab to modify the values.

ID:
Type:
Description:
Creation Date:
URL:
Image URL:

5
ITEM
Proizvod 4
2012-09-29 11:00:59.0
<http://localhost/drupal/node/5>
[http://localhost/drupal/sites/default/files/Screenshot_2012-09-27 at 1.04.51 PM.png](http://localhost/drupal/sites/default/files/Screenshot_2012-09-27_at_1.04.51PM.png)

Active:
Clusters:

true
None

Figure 5.3: Easyrec prikaz jednog "item"-a

ubercart2

[Overview](#) • [Items & Rules](#) • [Statistics](#) • [Top Ranked](#) • [Hot Recommendations](#) • [Cluster Manager](#) • [Type Manager](#)

Top Ranked Items on "ubercart2"

Top Ranked Items shows the items most often acted on within the selected time range.

Notice: Rankings are updated every 24 hours.

showing **Most Viewed Items** from **last 31 days**

Id	Description	Type	
5	Proizvod 4	ITEM	
3	Proizvod 2	ITEM	

Figure 5.4: Easyrec "top ranked" artikli

ubercart2

[Overview](#) • [Items & Rules](#) • [Statistics](#) • [Top Ranked](#) • [Hot Recommendations](#) • [Cluster Manager](#) • [Type Manager](#)

Hot Recommendations on "ubercart2"

The hot recommendations list shows the most popular recommended items, i. e. items that easyrec presented to the user as part of a recommendation and were then clicked on by a user. The hot recommendations list shows the most popular recommended items.

Id	Description	Type	
1	Product 1 (3 recommendation hits)	ITEM	
5	Proizvod 4 (3 recommendation hits)	ITEM	
3	Proizvod 2 (2 recommendation hits)	ITEM	

Figure 5.5: Easyrec preporučeni ("hot recommend") artikli

Type Manager

Use the to create different types used within your easyrec instance.

Item Types


Action Types

Assoc Types


Item Type Manager

Use the item type manager to create [Item types](#). Item types are the main categories of your items, e.g. Books, Music or Movies. After creating an item type you are ready to use it in API calls.

(Clusters can be managed in the [Cluster Manager](#) and describe custom collections of items. Use it to create subcategories of item types (like "Pop", "Rock", "Alternative" as subcategories of Music items) or to create special recommendations like "Christmas" or "Spring Collection".)

 **Note:** Once an itemtype has been created it cannot be removed!

Item Types for ubercart2

 [add new Item Type](#)

Item Type Name
ITEM

Figure 5.6: Easyrec tipovi "itema" (stavki koje ocjenjujemo i preporučujemo)

Type Manager

Use the to create different types used within your easyrec instance.


Item Types

Action Types

Assoc Types

Action Type Manager

Use the item type manager to create [Action types](#). Action types are the types of your actions you send to easyrec. After creating an actions type you are ready to use it in API calls.

 **Note:** Once an actiontype has been created it cannot be removed!

Item Types for ubercart2

+ add new Item Type

Item Type Name	Has Value
BUY	false
RATE	false
VIEW	false

Figure 5.7: Easyrec akcije koje se bilježe za stavke

Type Manager

Use the to create different types used within your easyrec instance.


Item Types

Action Types

Assoc Types

Assoc Type Manager

Use the assoc type manager to create [Assoc Types](#). Assoc types are used to define the relation between two items. As an Administrator you can set specific Plugins for each assoc type.

 **Note:** Once an Assoc Type has been created it cannot be removed!

Assoc Types for ubercart2

+ add new Assoc Type

Assoc Type Name
BOUGHT_TOGETHER
GOOD_RATED_TOGETHER
IS_RELATED
VIEWED_TOGETHER

Figure 5.8: Easyrec asocijacije između stavki

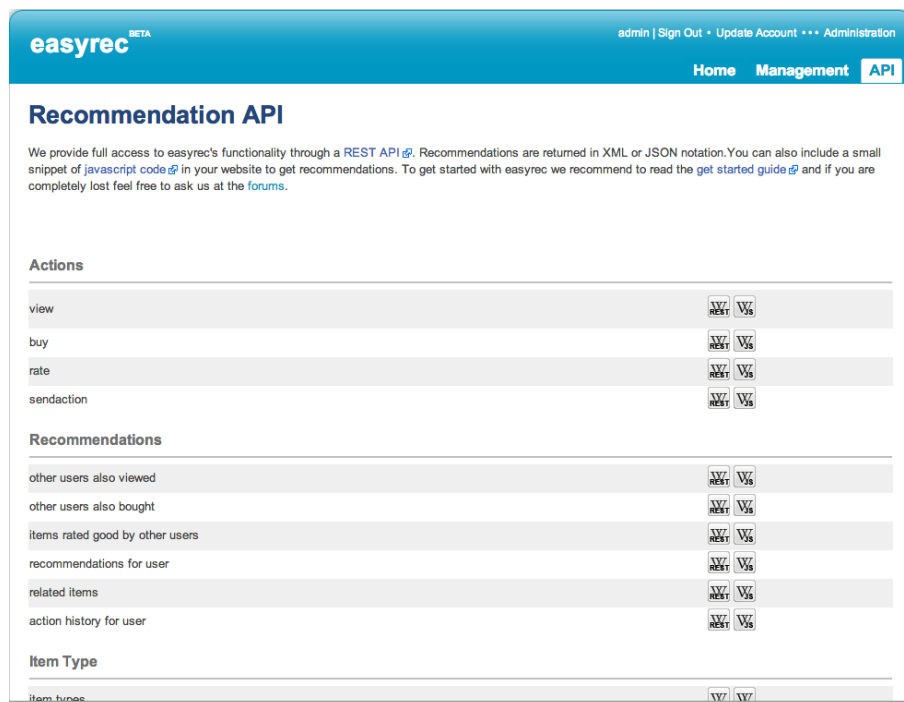


Figure 5.9: Easyrec API putem koje "third-party" e-commerce aplikacija pristupa

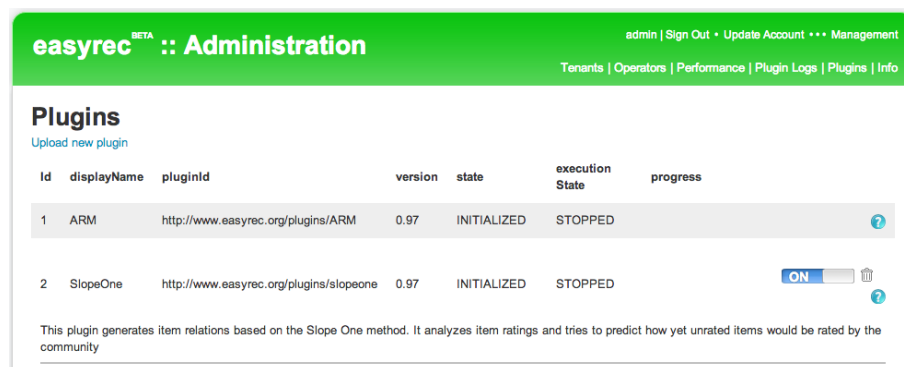


Figure 5.10: Algoritmi koji se primjenjuju su easyrec plugin-ovi

6. Bibliography

Patrick Marshik. *Evaluation of Collaborative Filtering Algorithms*. Doktorska disertacija.

Appendix A

Software toolset

1. Mac OS X 10.8.2
2. mvim, vim tekst editor ver 7.3
3. MacTex (TeX Live 2012)

Appendix B

Software repozitoriji

- drupal web content framework <https://github.com/hernad/drupal>
- easyrec source code <https://github.com/hernad/easyrec>
- PeB izvorni kod seminarskog rada https://github.com/hernad/FIT_PeB