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## **ORGANIZATION MANAGEMENT IN DRUPAL**

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## **PREFACE**

This thesis was made on the topic of "Organizations Management in Drupal". It was prepared by Mengistu Daniel Mekonnen as a final year thesis. This thesis was made under supervision of the representative from the topic provider Soncatec Oy, Tuomas Harju and from school Oulu University of Applied Sciences, Lea Hannila.

Raahe , May 2013

Mengistu Daniel Mekonnen

## TIIVISTELMÄ

Oulun seudun ammattikorkeakoulu  
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Tällä teknologisesti kehittyneellä aikakaudella useimmat yrityksistä tarjoavat Internet-palveluita toisille alan yrityksille. Sonatec Oy on yksi niistä yrityksistä, joka tarjoaa palveluitaan muille yrityksille. IT-alan yritysten haasteena on tarjota luotettavaa ja turvallista tapaa organisoida ja hallinnoida yrityksen asiakkaiden tietoja. Tässä opinnäytetyössä olen tutkinut, kuinka luoda asiakastietojärjestelmä Drupal Cartaron jakamisominaisuuksia laajentaen.

Sonatec -portaalin käyttö mahdollistaa yrityksen informaation hallinnan, niin että jokainen pääsee oman organisaationsa tietoihin. Mukaan hankkeeseen kuvaus on että saan Sonatec Oy kehittäen organisaation hallinta moduuli. Sonatec-järjestelmänvalvojalla on täydet oikeudet kaikkiin organisaation portaalin osiin. Yrityksen työntekijät voidaan lisätä joko organisaation portaaliin tai Sonatecin portaaliin. Kun yrityksen työntekijä kirjautuu sisään Sonatecin portaalin kautta, hänet uudelleen ohjataan hänen oman organisaationsa portaaliin, niin että työntekijä pääsee käsiksi vain hänelle sallittuihin tietoihin. Tämä moduulin avulla voidaan hallinnoida organisaation tehtäviä kuten tietojen säilyttäminen, hakeminen, päivittäminen ja poistaminen Sonatec Oyn datapankissa. Sen lisäksi käyttäjillä on omat roolit organisaatiossa, mihin heidät on rekisteröity.

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Asiasanat : *Drupal, Cartaro, PHP, PostgreSQL*

## ABSTRACT

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In this technologically advanced era, most companies are providing their services through Internet to serve different organizations which are doing the same kind of business. Soncatec Oy is one of those companies which provide its services to different snowmobile rentals and snowmobile safaris. For those IT companies providing different kinds of services for different customers in a reliable and secure way is one big task in addition to managing and organizing customer's information. In this thesis I have tried to make a research on how to make a custom module to extend the Drupal Cartaro distribution capabilities so as to manage organization's information. According to the project description that I got from Soncatec Oy I developed organization management module. Soncatec administrator has full right on all organization's portal tasks. The staff of an organization can be added either in the organization portal or in the soncatec portal in order to use the services. When the staff of any organization login through the soncatec portal, the user will be redirected to his organization portal. That will restrict users to have access only to the organization they belong. This module will perform administrating organizational tasks like storing, retrieving, updating and deleting organization's information on Soncatec oy's database in addition to that users will be assigned a specific role in that organization they are registered to.

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Keywords: *Drupal, Cartaro, PHP, PostgreSQL*

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## ABBREVIATIONS AND ACRONYMS

**CMS:** Content Management System: a system that is used to store, process and manage different kinds of contents as well as data, in this case both the geographic data and other kinds of data like user information, images and maps.

**OGC:** Open Geospatial Consortium: is an international voluntary consensus standard organization that works in collaboration with governmental, non-governmental, commercial and non-commercial organizations all over the world to develop an open standard for geospatial content and services, GIS data processing and data sharing.

**WMS:** Web Map Service: is one of the standards set by OGC that is used to request a geospatial database(s) for a geographic layer(s) and response to a request is a geo-registered map image(s) will be returned.

**WMS-C :**Web Mapping Service – Cached: is a way of getting geo-registered maps from existing servers or a machine that has used it before or somewhere that data was saved before.

**WMTS:** Web Map Tile Service: is a specification for storing and retrieving cartographic data.

**KML:** Keyhole Markup Language: is another standard set by OGC that focuses on the visualization, presentation of geographical maps or images on the globe and also control navigation of user like where to go and where to look.

**GPL:** Global Public License: is a license that allows any person or organization freely use, share, make changes and sell anything in the source code.

**HTML:** Hypertext Markup Language: is a web programming language that almost all website are written with.

**CSS:** Cascade sheet style: is a web content style programming that web developers use to make a lay out of the page and formatting it.

**IDE:** Integrated development Environment: is a place to write code, run, debug and more, in this case I am using an IDE called APTANA.

**WRT:** Web Run Time: is an engine that allows Web applications to run outside the browser and also it allows widget installation, applications management and access to device features via JavaScript API.

# 1 INTRODUCTION

Soncatec Oy is one of the start-up information technology companies in northern Finland, Rovaniemi. Rovaniemi is known for having different seasons and activities related to them. In winter time a lot of visitors are traveling to ski, ice fishing, drive snowmobiles and others.

Snowmobile safaris are suitable for group activities. One typical example of it is that families can come there and children usually have different set of activities. Some of them who are qualified for driving a snowmobile may want to go for a snowmobile drive in a frozen forest and other children may do some other activities and parents also want to have their own time while their children are engaged on their activities. At the same time, parents want to know that their children are safe, more specifically those who went to drive in a frozen forest.

Snowmobile safaris want to have and provide precise information about the snowmobiles they are renting. Having that information and managing the snowmobile they are renting will make their work efficient and productive in many ways, that is, real time tracing of snowmobiles, showing reserved and available snowmobiles, technical information about snowmobiles.

Soncatec Oy has been engaged on different projects in different areas of information technology. Among those projects developing a system to manage a snowmobile is one of them. This document is one small part of it.

Soncatec Oy provides a portal called Soncatec portal which is a service platform, which contains stored business data from different organizations. How the data is collected from customers, is not a topic of this document. This document does not explain the whole project and how things are done. As this project is one part of a big project I will focus on a small portion of it. The aim of this document is to create the rationale of an organizations management system, that is to design a database schema to store organization's information as well as to create organization management system to perform organization management tasks that include adding, modifying and deleting organization's information to Soncatec portal database and at the time of user registration, users will be added to an organization they belong and assigned a role.



## **2 THE WORK ENVIRONMENT**

In today's web technology there are many companies which "offers a complete set of infrastructure and application services that enable companies to run virtually everything in the cloud: from enterprise applications and big data projects to social games and mobile applications. One of the key benefits of cloud computing is the opportunity to replace up-front capital infrastructure expenses with low variable costs that scale with companies business". (1.)

The deployment server we are going to use is Ubuntu 12.x with Apache 2.2 in Amazon Web Services.

Since the scale of this project is big and can take a long period of development time if we start to build it from the scratch, so to resolve this problem we are going to use the advantage of open source software.

### **2.1 Platform and Tools**

Open source is a philosophy, or pragmatic methodology that promotes free redistribution and access to an end product's design and implementation details. "Generally, open source refers to a program in which the source code is available to the general public for use and/or modification from its original design. Open source code is typically created as a collaborative effort in which programmers improve upon the code and share the changes within the community. Open source supported in the technological community as a response to proprietary software owned by corporations". (2.)

In this project we are going to use one of the powerful content management distributions of Drupal called Cartaro.

Drupal is a content management framework written in PHP, server-side-programing, developed and maintained by thousands of people having common interest.

"It's distributed under the terms of the GNU GPL, General Public License, which means anyone is free to download it and share it with others. This open development model means that people are constantly working to make sure Drupal is a cutting-edge platform that supports the latest technologies that the Web has to offer". (8.)

“Drupal distributions are full copies of Drupal that include Drupal Core, along with additional software such as themes, modules, libraries, and installation profiles. There are two main types of Drupal distributions:

- Full-featured distributions  
All-inclusive products: complete solutions for specialized use cases.
- Other distributions  
Quick-start tools: starting points for developers and site builders.

With a "full-featured" distribution, you can quickly and easily set up a site for a specialized purpose such as academic, business, government, nonprofit, publishing, and social, etc., in few steps”. (9.)

Among Drupal distribution in our project, we will use Cartaro as a starting tool.”Cartaro is the web mapping platform that brings the power of the best open source geospatial components into a content management system. With Cartaro you are able to set-up and run your own geo-enabled and OGC standards-compliant website”. (3.)

The geospatial components used in Cartaro are

- PostGIS

“PostGIS is a spatial database extender for a PostgreSQL object-relational database. It adds support for geographic objects allowing location queries to be run in SQL”. (4.)

- GeoServer

“GeoServer is an open source software server written in Java that allows users to share and edit geospatial data. Designed for interoperability, it publishes data from any major spatial data source using open standards”. (5.)

- GeoWebCache

“GeoWebCache is a Java web application used to cache map tiles coming from a variety of sources such as OGC Web Map Service (WMS). It implements various service interfaces (such as WMS-C, WMTS, Google Maps KML, Virtual Earth) in order to accelerate and optimize map image delivery. It can also recombine tiles to work with regular WMS clients”. (6.)

- OpenLayers

“OpenLayers makes it easy to put a dynamic map in any web page. It can display map tiles and markers loaded from any source. Open Layers has been developed to further the use of geographic information of all kinds”. (7.)

All those are managed within the powerful CMS Drupal.

## 2.2 Setting up the development environment

The operating system that I am using throughout the production time is Ubuntu 12.04.2 LTS. The main reason that I chose to use this operating system is that because the deployment machine will also have the same operating system so at the time of hosting, there will be no problem of configuration and other surprising problems.

As Cartaro is a combination more than one open source components, we have to make sure that the entire prerequisites are met.

Running the following code on the terminal will install all the prerequisites and dependency libraries.

```
sudo apt-get install unzip apache2 php5 php5-gd php5-curl  
php5-pgsql postgresql postgis postgresql-9.1-postgis  
postgresql-contrib-9.1 tomcat7
```

Using the above terminal command I installed apache2, which is the local host server, it is going to run a local development server, php5 which is the server side script and Drupal is written in it. We are going to use PHP language to develop our own module, PostgreSQL database which is used to store geographical information and also Drupal tables which are created at the time of installation, and other dependency libraries.

Geo-server is another open source tool that has offered a free and open geospatial data publication. Here we need to note that when we are installing GeoServer, it has "root" as a user and "geoserver" as a password and this is going to be the user name and password we are going to use when we are installing Cartaro. The other way to do the same thing is that after installing Geo-server with a default set up, then by opening <http://localhost:8080/geoserver> we can create another user account that we are going to use later in the installation of Cartaro.

```
wget http://downloads.sourceforge.net/geoserver/geoserver-  
2.2-war.zip
```

The above code snippet is used to download geo-server and the code snippet below is used to install it.

```
sudo unzip geoserver-2.2-war.zip geoserver.war -d  
/var/lib/tomcat7/webapps/
```

The next step is to create a PostgreSQL database. There are two ways to do it, either from the terminal or using other helping tools. In this document I am going to use both and we can install the helping tool using the following command.

```
sudo apt-get install phppgadmin
```

Using the above command, a helping tool can be installed, which manages the PostgreSQL database. It can be accessed from local host URL <http://localhost/phppgadmin/>.

Other tools used are a code editor IDE, integrated development environment, Aptana studio and a yED graph editor.

“Aptana Studio is an open source integrated development environment (IDE) for building Ajax web applications. Based on Eclipse, it supports JavaScript, HTML, DOM and CSS with code-completion, outlining, JavaScript debugging, error and warning notifications and integrated documentation. Additional plugins allow Aptana Studio to support Ruby on Rails, PHP, Python, Perl, Adobe AIR, Apple iPhone and Nokia WRT (Web Runtime). Aptana Studio is available as a standalone on Windows, Mac OS X and Linux, or as a plug in for Eclipse”. (10.)

“yEd is a free of charge general-purpose diagramming program with a multi-document interface. It is a cross-platform application written in Java that runs on Windows, Linux, Mac and other platforms that support the JVM, Java virtual machine.

yEd can be used to draw many different types of diagrams, including flowcharts, network diagrams, UML diagrams, mind maps, organization charts, and entity relationship diagrams”.(11.)

### 3 DEFINITION

Soncatec portal is a portal which gives different services to different business organizations such as, snowmobile rentals and snowmobile safaris. The service provided by the portal is mainly managing snowmobiles for example: tracking the route, displaying the snowmobile on a map, finding out available snowmobiles and reservation information and other related information.

Soncatec oy provides a Soncatec portal service to other organizations. When the number of organizations increases, there is a need to develop a system to manage those organizations or customers and staffs under each organization. The main focus in this document is on developing a system to manage organizations and staff or employees of those organizations.

When a new organization wants to use the Soncatec services, the organization information must be given and an account will be created by the Soncatec administrator. When an account is created an organization will have a unique ID that will be used later to manipulate organization information .Organization will have a portal to use the services from soncatec portal that is fully customer specific data and customizable by organization administrator(s).

Services provided by Soncatec oy via Soncatec portal may have branded sites for each customer in order to have a proper look and feel. Customer specific branding (or customization) is implemented using Drupal's multi-site configuration. This allows customer specific domain names to be assigned into the portal (like [www.custa\\_a.com](http://www.custa_a.com)), a sub-domain (like [cust\\_a.soncatecportal.com](http://cust_a.soncatecportal.com)), or a customer can use some shared, multi organization service domains (like [service\\_a.soncatecportal.com](http://service_a.soncatecportal.com)).

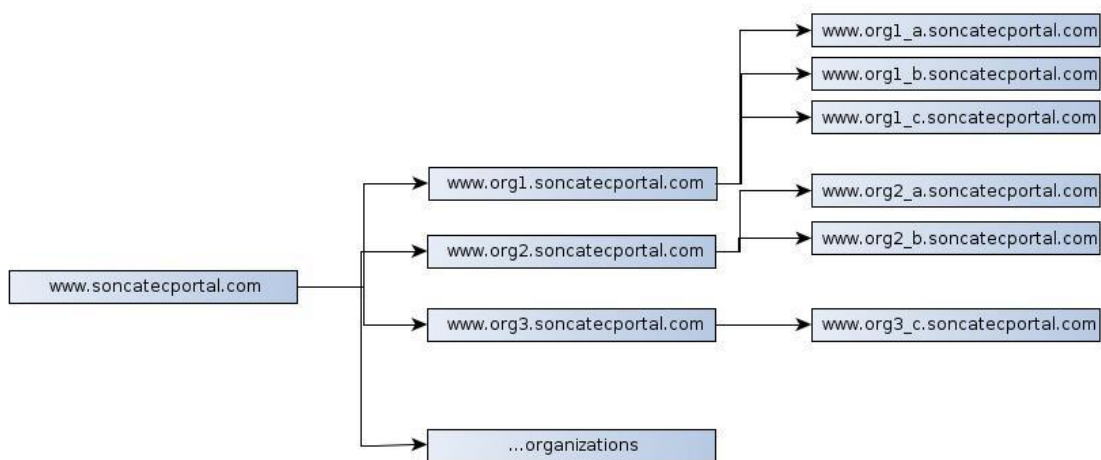


FIGURE 1.Hierarchy of domain and sub-domain

As we can see in the above figure a multi-site implementation is built for organizations, but it is not an organization. In theory, one organization may have several multi-sites.

### 3.1 Data storage and Database

All Drupal related data is stored into database(s) created by Drupal, and all organizations data must be stored into a separated database or tables. Drupal database can be used if it can be avoided when creating assignments between Drupal users and roles from organization databases.

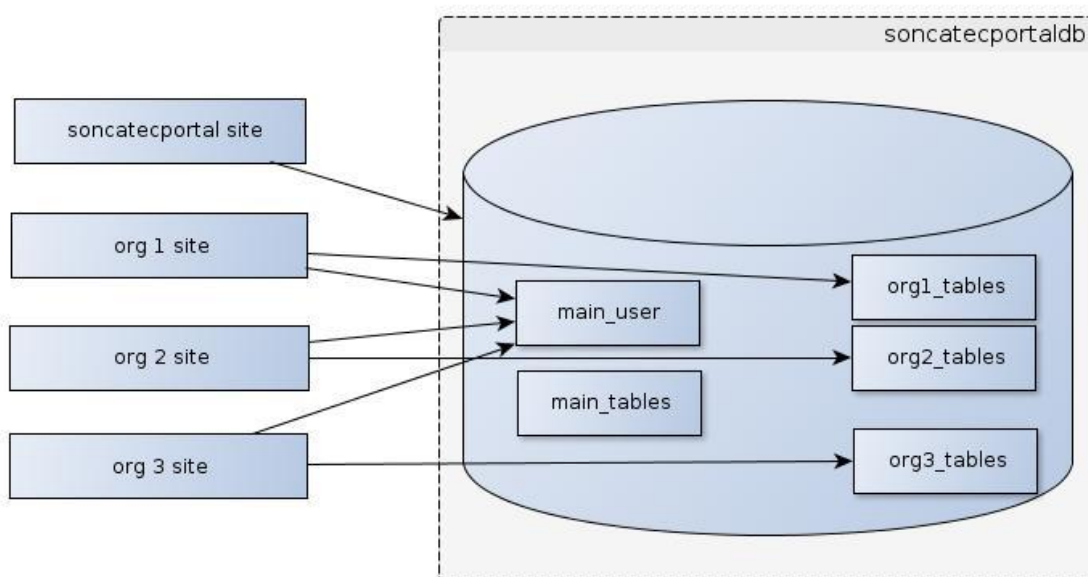


FIGURE 2. Organizational database architecture

The above figure shows that each organization will have their own tables, which are specific and only accessed by the organization and Soncatec portal. The user table from Soncatec portal tables, which are under 'main\_' prefix, are shared for the whole organization so that the super administrator can access and manage a customer's database.

### 3.2 Credential management and access policy

Drupal platform is responsible for authenticating users at a platform level. Possible roles are:

- Administrator
- Authenticated user
- Anonymous user

Drupal administrators are system administrators. Their roles are strictly controlled and assigned by Soncatec Oy. Here after, I call Drupal administrator as 'superadmin'. A staff for the organization can be registered in normal Drupal sign up module that can be done at the portal level or at the organization level .After the account is created, it will be an authenticated user and authenticated users do not automatically have access rights to any organization or business data. Their membership and user role must be checked from organization data during a user log-in process. (It might be necessary to extend Drupal authentication module).

Organizations may have several roles, and those roles are defined by an organization administrator, who is typically customer's representative. Organization must have at least an organization administrator, who has access to all organizational data, but who does not have access to administrative functions of Drupal platform, but in Drupal, his user role is authenticated user.

### **3.2.1 Credential management**

Before a user can be assigned to any organization, they must be authenticated. Drupal platform has a basic process for authentication, and it must be followed. Optionally, an organization may require an additional authentication before a user can access business data. For example, some customer (organization) would require an authentication from a company owned back-end service. If an organization requires additional authentication, a customization is done in a separated project.

### **3.2.2 Module access policy**

An organizations' management system must provide in a simple way (API) to check the user's access rights level from any custom module implemented by Soncatec.

## **3.3 Functions of the project**

There is only one principle that must be followed as strictly as possible in the development of the project Do not modify Drupal modules but use hooks or write add-ins if needed. If modifications cannot be avoided, document them well.

Other than that, the aim and functionalities of the final product is to identify the needed organization related data and design a database schema for the organizations' database. Also, to

implement a top level administration module to verify the created database, and which has at least the following functionalities:

Organization management

- Creation
- Displaying organization details (not business data)
- Modifying
- Deleting

Also, each site must have an interface to:

- Create sub organizations
- Manage user roles
- Create, edit and delete roles
- API to check user role in organization



## 4 IMPLEMENTATION

First a PostgreSQL database should be created. Drupal will use it to store Drupal's table and also a geo-server will store, manipulate and fetch geospatial data from it .Using a terminal, the following commands will create a PostgreSQL database. In the command, the database name is 'soncatedcb', the database user is 'superadmin' and the password '123'.

```
sudo -u postgres /usr/lib/postgresql/9.1/bin/psql
postgres=# create role "superadmin" with login password
'123';
postgres=# create database "soncatedcb" with owner
"superadmin" encoding 'UTF-8';
```

The first command will navigate and connect to the PostgreSQL database and the second command will create a database user and a password and the last line will create a new PostgreSQL database and assign "superadmin" as an administrator.

The newly created PostgreSQL database does not have PostGIS which means it does not have the capacity to process geo-spatial data. So to install a PostGIS extension, the following command is used.

```
sudo su postgres
postgis$ psql -d "socatedcb" -f
/usr/share/postgresql/9.1/contrib/postgis-1.5/postgis.sql
postgis$ psql -d "socatedcb" -f
/usr/share/postgresql/9.1/contrib/postgis_comments.sql
postgis$ psql -d "socatedcb" -f
/usr/share/postgresql/9.1/contrib/postgis-
1.5/spatial_ref_sys.sql
postgis$ psql -d "socatedcb" -c 'grant all on
geometry_columns to "superadmin";'
postgis$ psql -d "socatedcb" -c 'grant all on
spatial_ref_sys to "superadmin";'
```

The next step is to make sure that the same user name and password is used for the PostgreSQL database and geo-server. It can also be set by login to the geo-server using a default user name and a password and make a new user account with admin privilege similar to the PostgreSQL database.

## 4.1 Multi-site installation and user table sharing

One of the great features of Drupal is its flexibility of running multi-sites from a single Drupal code base. There are great advantages of using multi-site. Some of them are: there is only one copy of a code base to run many websites. There will also be one code base to upgrade and one set of files to debug and still all multi-sites will have a site specific customization and have a site specific module and themes.

Before proceeding with a normal installation of Drupal, some changes has to be done on Apache setting configuration.

At the end of the following steps of configuration, a virtual machine will be set up to host three multi-sites domains. Domain `http://soncatecportal`, `http://org2.soncatecportal` and `http://org1.soncatecportal` will run in a virtual machine.

“Virtual hosting is a method for hosting multiple domain names (with separate handling of each name) on a single server (or pool of servers). This allows one server to share its resources, such as memory and processor cycles, without requiring all services provided to use the same host name”. (13.)

First, navigate to and open a host file saved and add a local site address, which are mentioned above

```
sudo gedit /etc/hosts
```

```
Add 127.0.0.1 soncatecportal
      127.0.0.1 Org1.soncatecportal
      127.0.0.1 Org2.soncatecportal
```

Save and close a hosts file.

Next, add three files for each of those sites in a sites-available folder.

```
cd /etc/apache2/sites-available
sudo gedit soncatecportal
```

Write and save the following code.

```
<VirtualHost *:80>
  ServerAdmin webmaster@localhost
  ServerName soncatecportal
  DocumentRoot /var/www/soncatec
<Directory />
```

Options FollowSymLinks

AllowOverride All

</Directory>

</VirtualHost>

The above command will create a virtual machine only for <http://soncatecportal>. Repeat the same procedure to create two more files and make everything all the same as Soncatec portal except "Server Name".

Virtual machine is ready to proceed an installation of Cartaro on the Soncatec portal server. A basic installation of Drupal should be followed and the prefix for the database tables should be set as 'main\_' so as to differentiate it from other multi-sites tables.

Before installing the other two multi-sites, two folders should be created. They will contain a site specific configuration, modules, files and themes with the same name as their domain name and a copy setting file from Soncatec portal installation.

```
cd /var/www/soncatecportal/sites
mkdir org1.soncatecportal
mkdir org2.soncatecportal
cp /var/www/soncatecportal/sites/default/settings.php
/var/www/soncatecportal/sites/org1.soncatecportal
cp /var/www/soncatecportal/sites/default/settings.php
/var/www/soncatecportal/sites/org2.soncatecportal
```

A "settings.php" file must be rewritable by others

```
chmod 775 /var/www/soncatecportal/sites/org1.soncatecportal
chmod 775 /var/www/soncatecportal/sites/org2.soncatecportal
```

Before installation a share user table with Soncatec portal, I need to make one change on the "settings.php" file on both sites.

```
$databases = array (
    'default' =>
        array (
            'default' =>
                array (
                    'database' => 'soncatecdb',
                    'username' => 'superadmin',
```

```

        'password' => '123',
        'host' => 'localhost',
        'port' => "",
        'driver' => 'pgsql',
        'prefix' => array(
            'default' => 'org1_',
            'users' => 'main_',
            'sessions' => 'main_',
            'role' => 'main_',
            'authmap' => 'main_',
        ),
    ),
);

```

Under the prefix, the Soncatec portal database has a prefix 'org1\_' for all tables which are only accessed by an organization 'org1', but the site is going to use a 'main\_' prefix table for users, sessions, role and auto map tables. This means that when the user has logged in any of those sites, Drupal will check the user input from the Soncatec portal user table.

An organization portal installation can be done using a browser and URL <http://org1.soncatecportal> and <http://org2.soncatecportal> for organizations 'org1' and 'org2' respectively and follow the normal Drupal installation.

Use 'org1\_' and 'org2\_' prefix for the database to specify which tables belong to which organization and restrict others to access it through the default installation.

## 4.2 Extending Cartaro capabilities

A successful installation and setup of Cartaro has all the basic functionalities of CMS and geo-spatial data manipulation. To add functionalities which are more specific to this project, a module should be created. There are three kinds of modules in Drupal.

1. **Core modules:** contain basic functionalities of the content management system. They include a user management, a content management, and some other things. Core module ship with Drupal and approved by Drupal core developers and the community.

2. **Contributed modules:** These modules are created to extend the capabilities of Drupal core functionalities and add new features. Contributed modules are shared under GNU public license.
3. **Custom modules:** Those kinds of modules are designed by website developers for a specific task in their own project. A custom module contains three basic files.

Cartaro has many cores and contributed modules that give a high flexibility and an easy customization to developers. There is no module that does what this project is supposed to do, so there is a need to extend and develop this project specific module.

By default Modules are installed in a directory `"/var/www/soncatec/sites/all/modules"` and to separate customized module, another folder called `"custom"` is created in the modules directory. A module contains three basic files which have a `'modulename.info'`, `'modulename.module'`, `'modulename.install'` format. In this project `'modulename'` will be `'manage_portal'`. A module folder and those files will be created in `"/var/www/soncatec/sites/all/module/custom/"` with the same name `"manage_portal"`. The commands below are used to navigate to the module folder, create a custom folder, give a write and read permission, and create three basic files needed for the module.

```
cd /var/www/soncatec/sites/all/modules/
mkdir custom
chown -R www-data:www-data custom
chmod 775 custom
cd custom
mkdir manage_portal
chown -R www-data:www-data manage_portal
chmod 775 manage_portal
cd manage_portal
sudo gedit manage_portal.info
sudo gedit manage_portal.install
sudo gedit manage_portal.module
chown -R www-data:www-data manage_portal.info
manage_portal.install manage_portal.module
chmod 777 manage_portal.info manage_portal.install
manage_portal.module
```

The last line of the command will assign any user a write read execute permission.

### "manage\_portal.info"

```
name = Manage Portal
description = Manage portal is a module used to manage
organization in soncatec portal.
core = 7.x
package = portal Management
Version = 1.0
```

In the above, code 'name' describes the name of the module , 'description' explains what the module is doing , 'core' explains, as there are different cores for Drupal, which core is used for developing the module, 'package' tells where the module will be categorized and saved and the last line 'version' tells about the current version of the module.

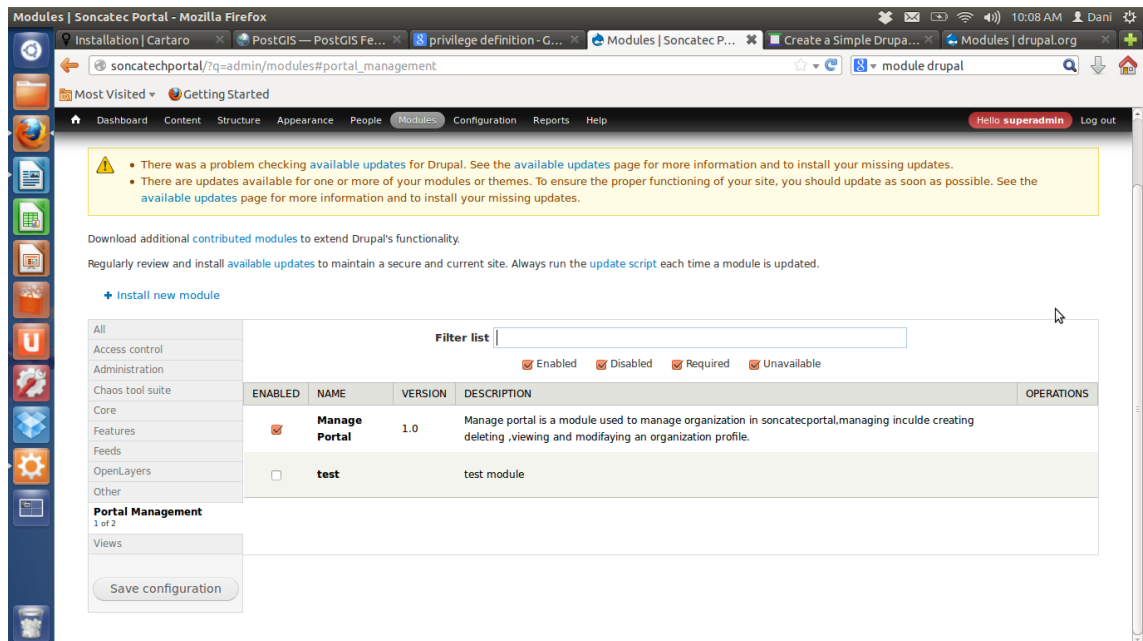


FIGURE 3. Shows how it looks like in module management page

### "mange\_portal.install"

When this module is enabled, the first file that will be executed is "manage\_portal.install". It contains the data schema of the table that is going to be created. To make this module inclusive to other database types like MySQL and MySQLi ,which is not specific to postgre, it is designed in a way that first it will check what kind of database driver there is and depending on that, it will run a query to create a table .

main_organization
id SERIAL
first_name varchar(80) NOT NULL
last_name varchar(80)
org_name varchar(80)
bid varchar(80)
address varchar(80)
postcode varchar(80)
city varchar(80)
tel varchar(80)
email varchar(80)
PRIMARY KEY(id)

FIGURE 4. Organization database schema

### "manage\_portal.module"

Here is where the actual custom-code is written. Drupal will run the custom code when it is written in a Drupal standard, for example, when a user logs in, Drupal will send an event and will look in all modules if any module has some task or something to happen when a user logs in. For Drupal to get and run a custom code, right hooks must be implemented." A hook is a PHP function that is named like `foo_bar()`, where "foo" is the name of the module (whose file name is thus 'foo.module') and "bar" is the name of the hook. Each hook has a defined set of parameters and a specified result type.

To extend Drupal, a module need simply implement a hook. When Drupal wishes to allow intervention from modules, it determines which modules implement a hook and calls that hook in all enabled modules that implement it". (12.)

The first hook that is implemented in a 'manage\_portal' module is `hook_menu()`.By using this hook,a custom menu will be added to the administrative menu. This project tasks are performed only by the administrator and it is restricted from other users.

```
function manage_portal_menu() {
    $items['admin/config/administration/manageportal'] = array(
        'title' => 'Portal Management',
        'description' => 'implement organization management tasks',
        'page callback' => 'drupal_get_form',
        'page arguments' => array('multi_step_form'),
        'access callback'=>'user_access',
        'access arguments'=> array('administer_site_configuration'),
        'menu_name' => 'management',
```

```
);
return $items;
}
```

The above code snippet implements `manage_portal_menu()`. It sets 'title' that is the name of the menu, 'description' little description of what tasks are performed in it, 'admin/config/administration/manageportal' declares the path where in the administrative menu 'mange\_portal' menu will appear. 'page callback' declares a callback function and its argument is passed through 'page arguments'. 'access callback' will define a user access function and its parameter passes through 'access arguments'.

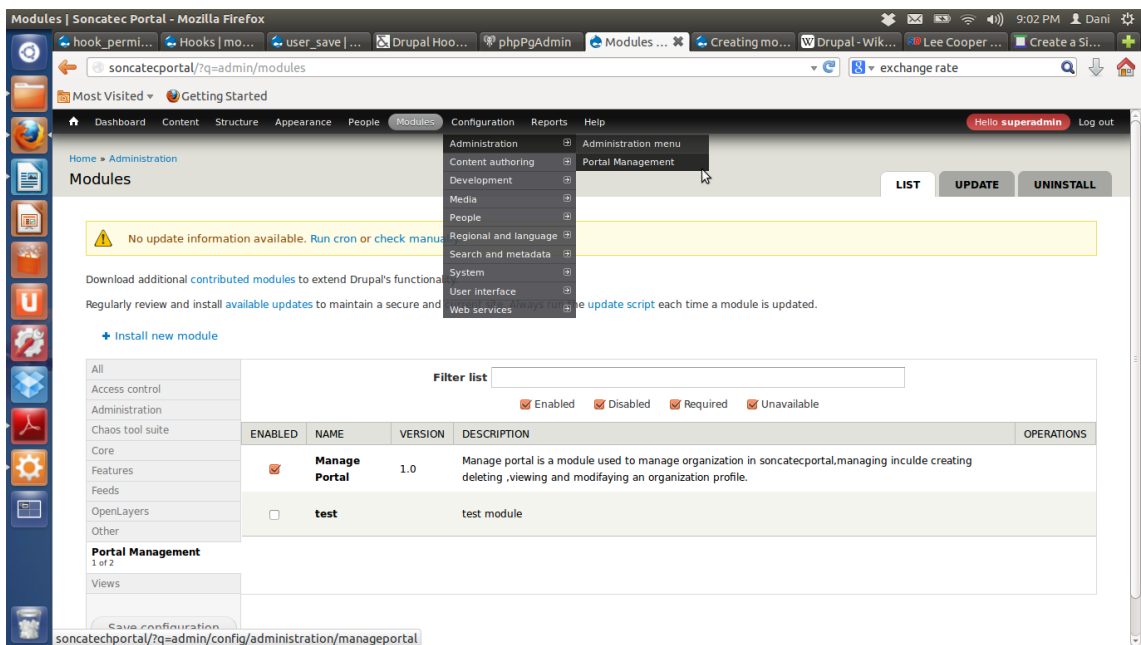


FIGURE 5. Shows as manage portal module is enabled, categorized under portal management and where the menu located

### 4.3 User registration and assigning to organization

Drupal framework is shipped with simple and basic authentication functionality. When it does not fulfill the authentication requirement needed for the project, it is possible to customize it. In this project there is a need to make some changes on the default authentication. Soncatec portal administrator, which is the super administrator, needs to have a complete privilege to add users or a staff of customer organization and grant different roles. This process will also restrict a staff from accessing to other organization's sites.



The default authentication form has basic fields to create an account. They are user name, password, email, and role. Below a code snippet shows by overriding a default user form additional field is added. The new field will fetch all registered organizations and when an organization is selected, it makes possible to assign it to a user at the time of an account creation.

```
function manage_portal_form_user_profile_form_alter(&$form, &$form_state,
$form_id) {
    _get_site_relation_form_element($form);
}

function _get_site_relation_form_element(&$form) {
    $db_adapter = new DbOrganization();
    $sites = $db_adapter->get(0);
    $site_options = array(0 => 'Choose organisation');
    foreach ($sites as $site) {
        $site_options[$site->id] = $site->org_name;
    }
    $default_value = 0;
    if (!empty($form['#user']->data['site_relation'])) {
        $default_value = $form['#user']->data['site_relation'];
    }

    $form['account']['site_relation'] = array(
        '#type' => 'select',
        '#options' => $site_options,
        '#title' => 'Organisation',
        '#default_value' => $default_value,
    );
}
```

## 5 TESTING

A module testing is performed to justify that:-

- When the module is installed in a new Drupal instance, it will create an organization table in the Soncatec database.
- When organization information is saved to the database, it should be saved into the newly created organization table.
- When organization information is retrieved for updating or viewing, it should be retrieved from the organization table.
- When organization information is updated, first it should retrieve the data from the database and then save the changes made.
- When organization information is deleted, it should delete only that information related to the organization in request.
- When the module is uninstalled, it should drop the organization table from the Soncatec database.

Different testing were done both manually and automatically. To run a manual test, first accessing in administrator privilege is necessary. First, log into Soncatec portal as a 'superadmin'. In the "module.install" file, the code has been written to show messages on the status of creating, updating, deleting and integrating a custom database table at the time of installation. When portal management module is enabled, it will show that the installation has begun and depending on the process if it is successful, it will show us a successful message and if not, it will display that installing database tables were unsuccessful. As shown in figure 6, 'mange\_portal' module is enabled and the table is created in that Soncatec portal database. The other way to check the database table created in Soncatec database is by opening <http://localhost/phppgadmin> and login as a 'superadmin' .There is a list of database servers under the 'soncatecdb' database server and under it there is a list of tables which are created at the time of installation and there a custom table is created.

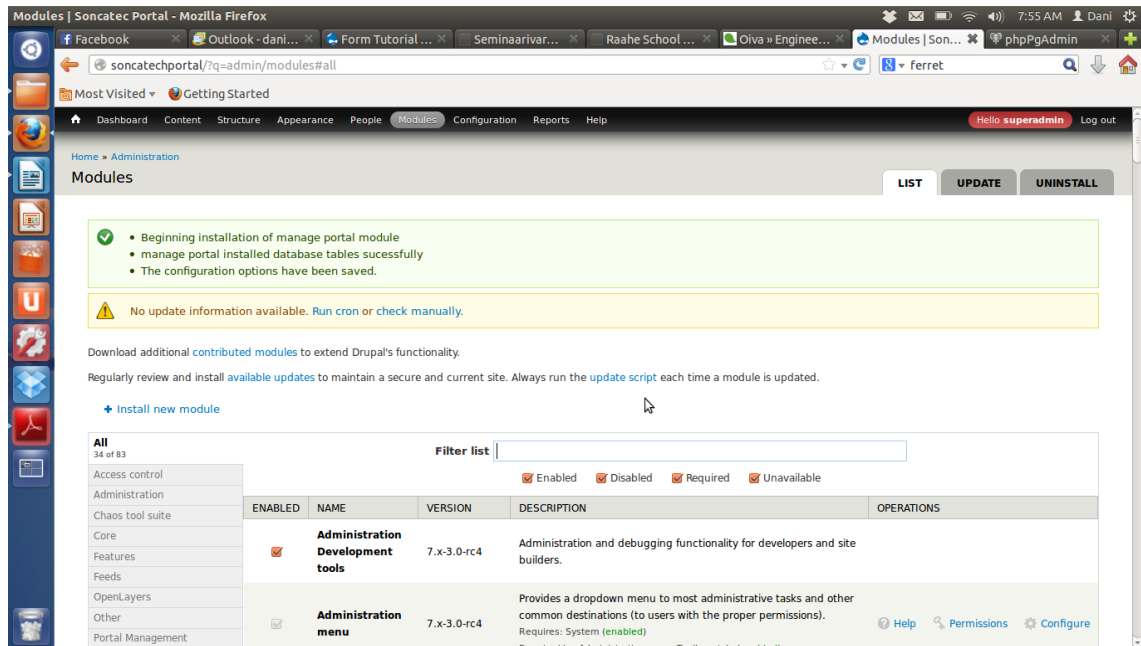


FIGURE 6. Shows that a custom table is created, installed and configuration has been saved

To test storing the newly created organization's information to the organization table, first create an organization by going to 'Configuration/Administration/portal management', then fill in the organization information, then press the 'submit-complete form' button. Checking on 'phppgadmin' page, it can be confirmed that the data has been saved to the organization table. Also as a successful completion of saving data to the organization table, there is message displayed to confirm that the organization's information has been saved successfully.

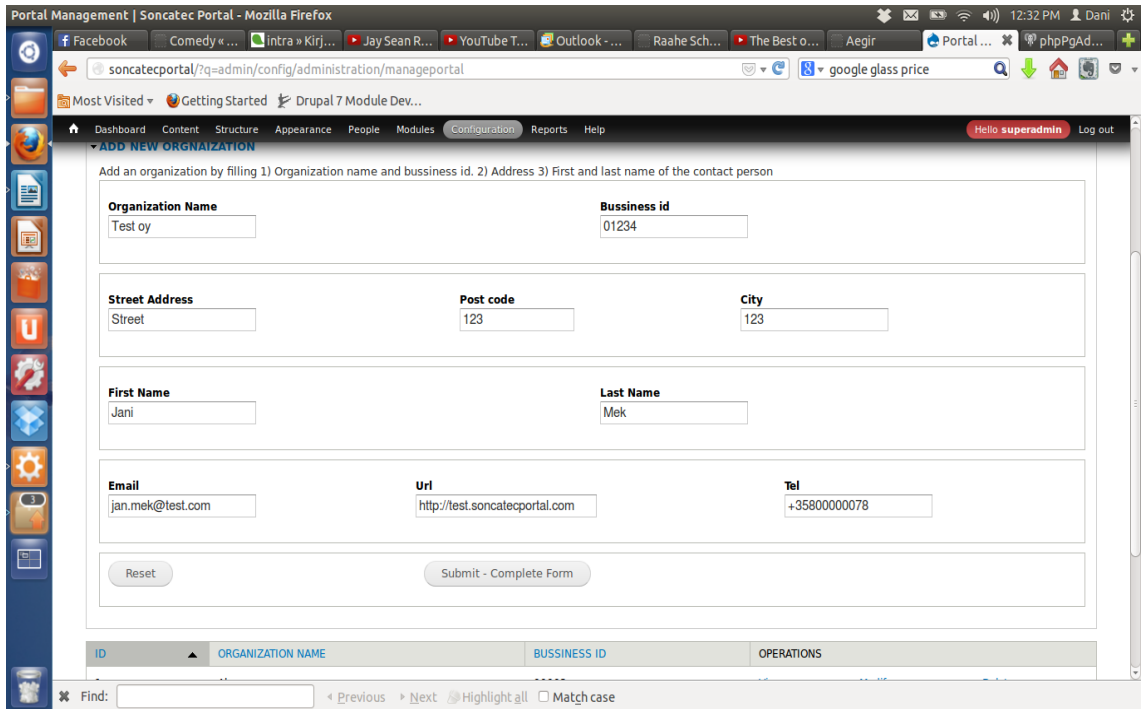


FIGURE 7. New organization's information ready to be submitted

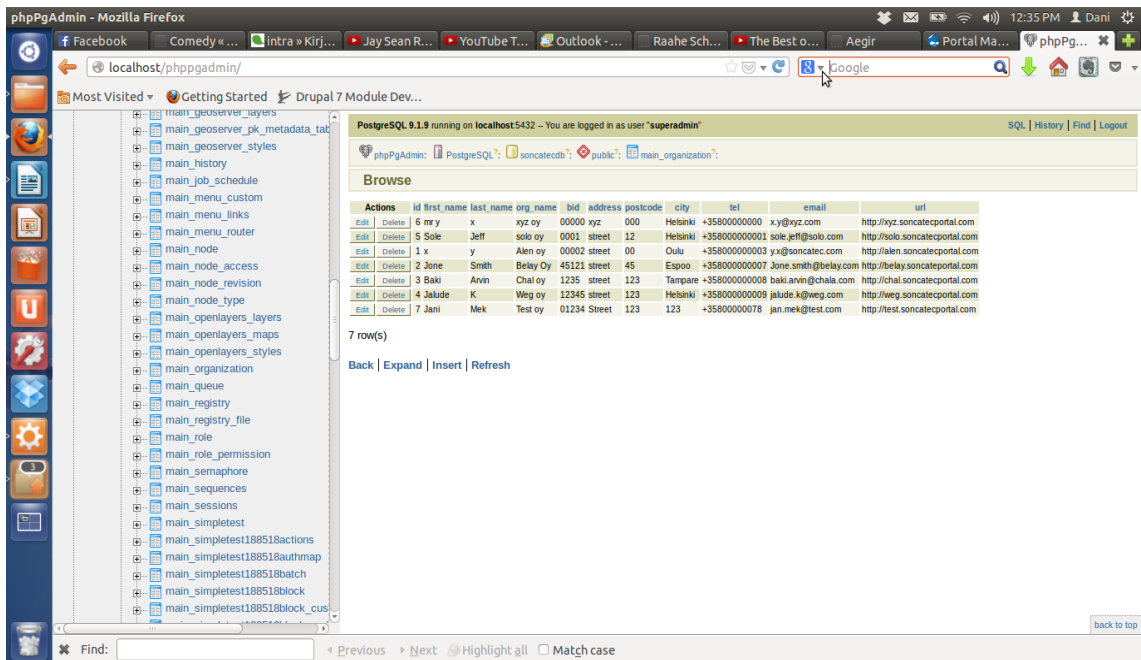


FIGURE 8. 'phpPgAdmin' page displaying all data saved in organization table

To test updating organization's information, select an organization from the list of organizations in the portal management page, then the selected organization's information will be retrieved from the database. After changes have been made, by pressing 'submit change' button, it can be saved into the database. By checking the organization profile or at 'phpPgAdmin' page, it has been confirmed that the changes made have been saved successfully.

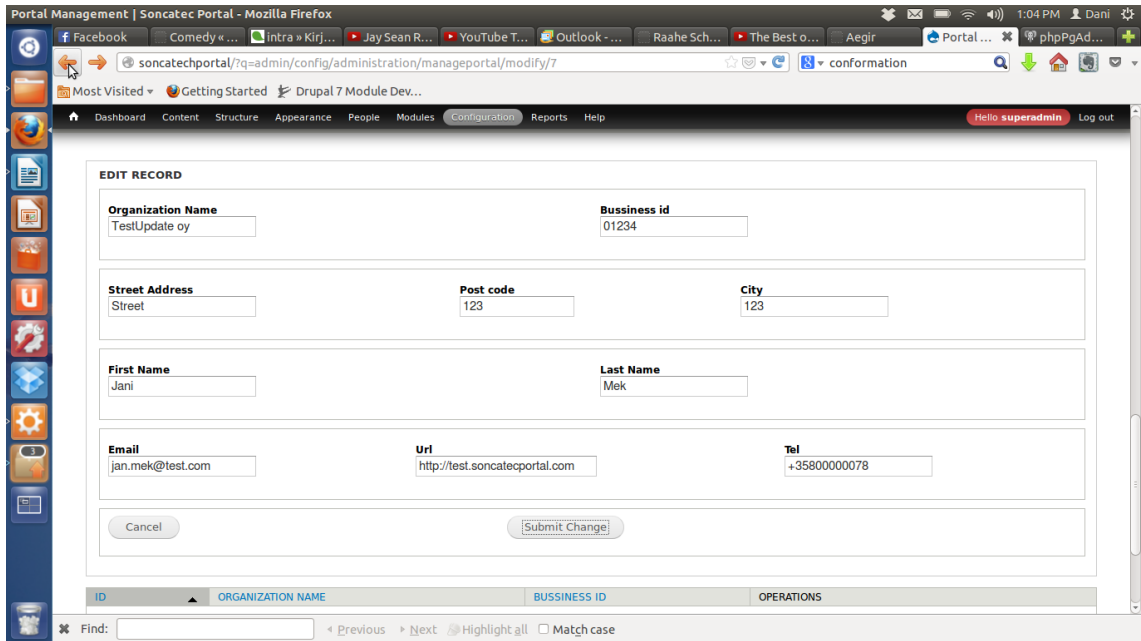


FIGURE 9. Test of organization information retrieved and organization name has been changed to testupdate oy

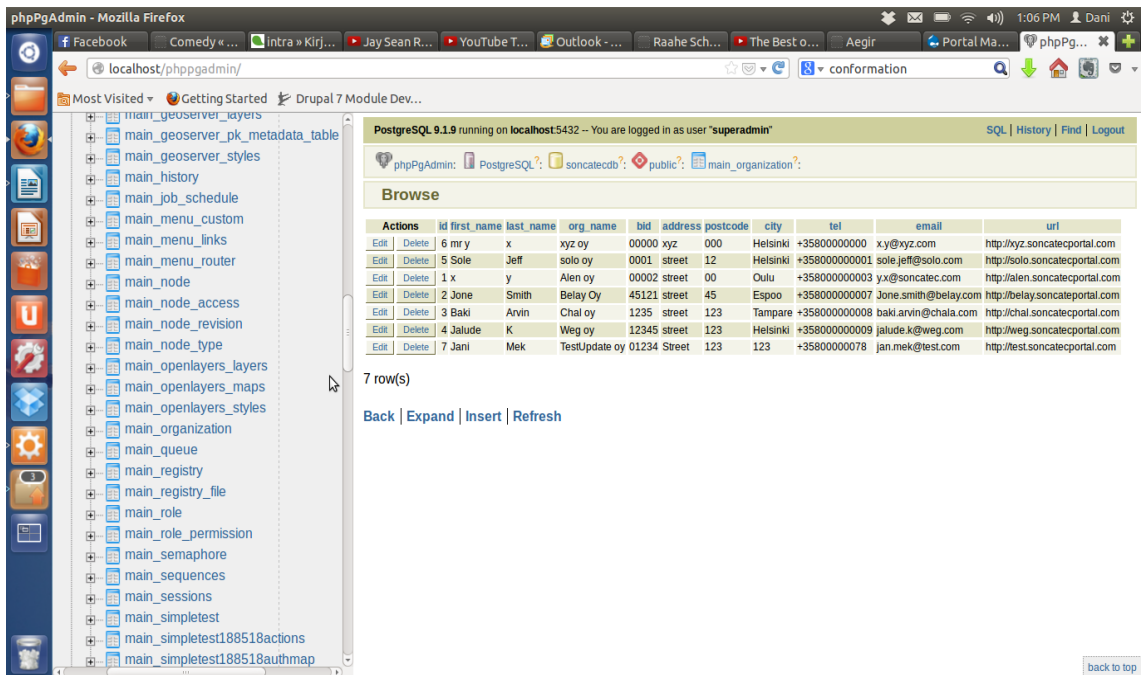


FIGURE 10. 'phpPgAdmin' page confirms the update done to test oy organization successfully

To test an organization's information has been deleted successfully from the database, an organization should be selected from the list of organizations in the portal management page. When a delete operation is selected, first, the organization's information will be retrieved and wait for the confirmation. If it is confirmed, then it will delete everything related to that organization. By opening 'phpPgAdmin' page, it has been confirmed that the organization's information has been

deleted

successfully.

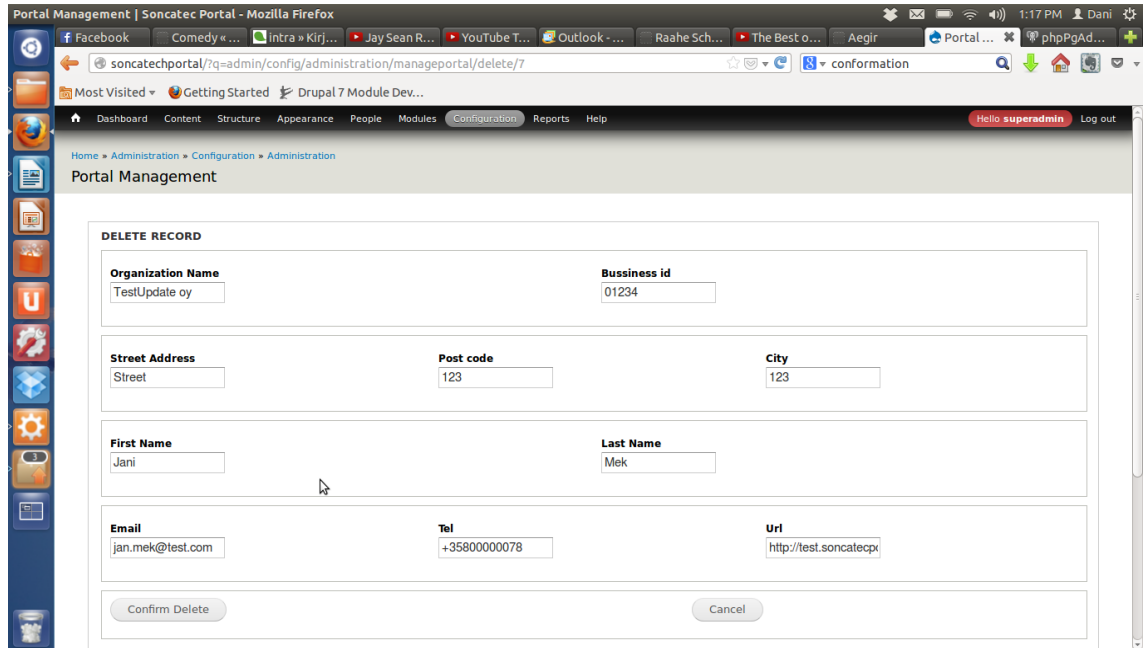


FIGURE 11. Portal management page displaying deleting organization's information

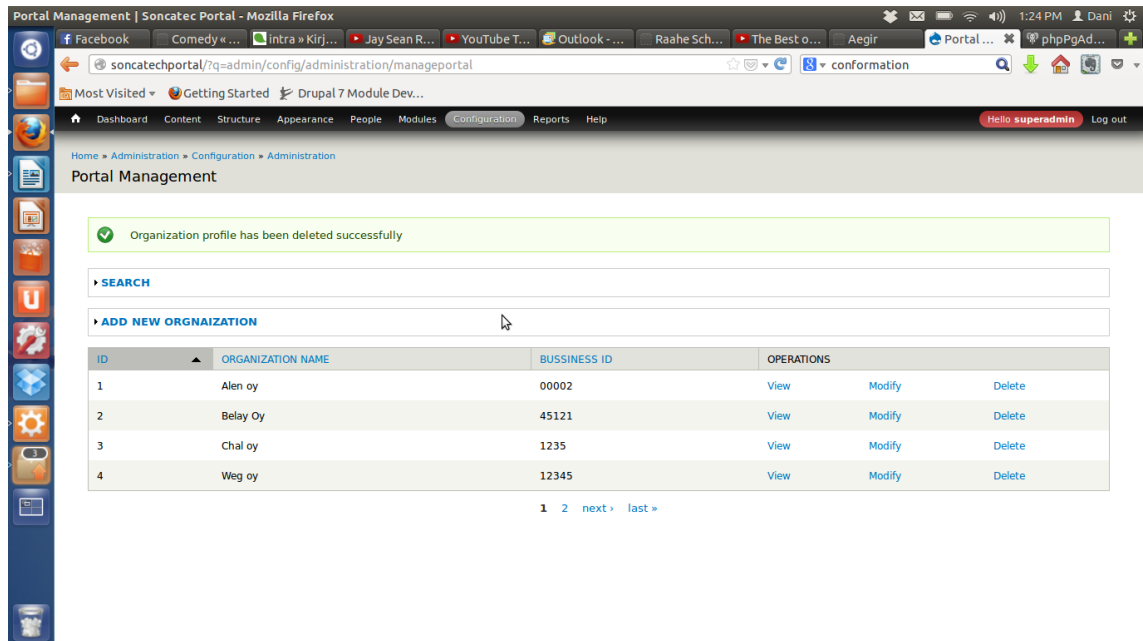


FIGURE 12. Portal management page displaying confirmation that an organization's information has been deleted successfully

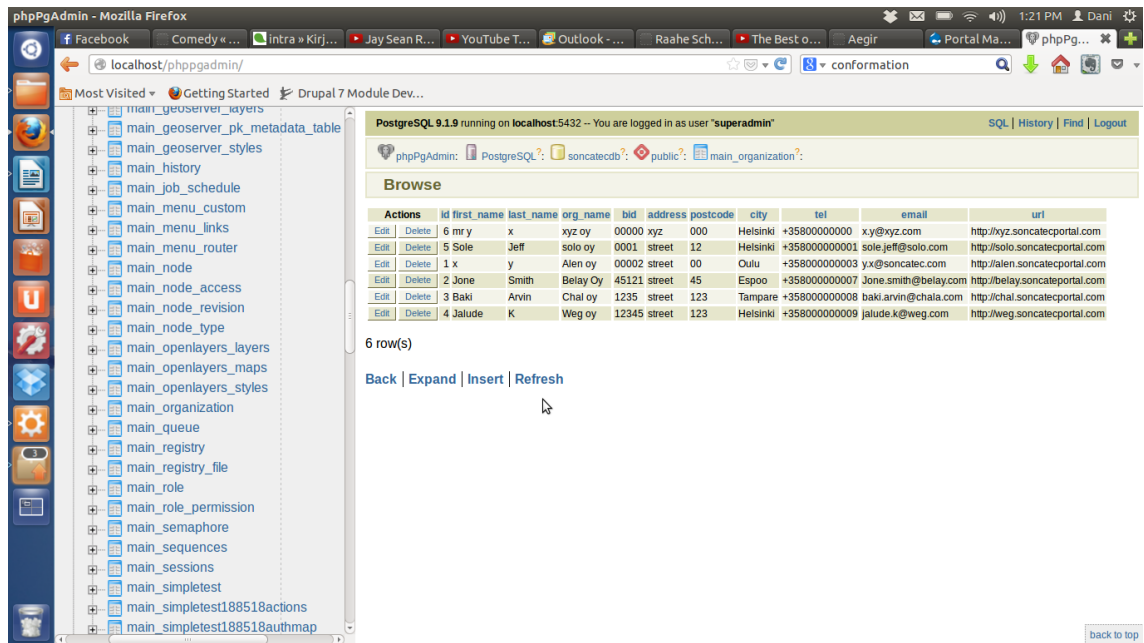


FIGURE13. 'phpPgAdmin' page confirms that an organization's information has been deleted successfully

Drupal 7 has come with a lot of advanced tools that let developers to focus and spend more time on coding than testing by providing an automated testing module. One of the key reasons that Drupal 7 has been stable is because it includes an automated testing module. The automated testing module has been used in this project to check the integrity of the custom module with the core module.

After enabling the testing module by navigating to 'configuration/development/testing', a page will show a list of tests and by selecting the tests which are appropriate to the project it starts running the test.

When the automated test has been run, what Drupal actually does behind the scenes, is to prepare a new complete Drupal installation that is going to be used in the testing environment. This will ensure that the starting point is the same every time the test is run. The other advantage of this approach is that the testing environment will not contaminate the development or the actual production environment data. After the test has been completed Drupal will clean and delete the Drupal testing environment. The testing module uses PHP cURL to walk through a defined series of tests just as it had been done manually.

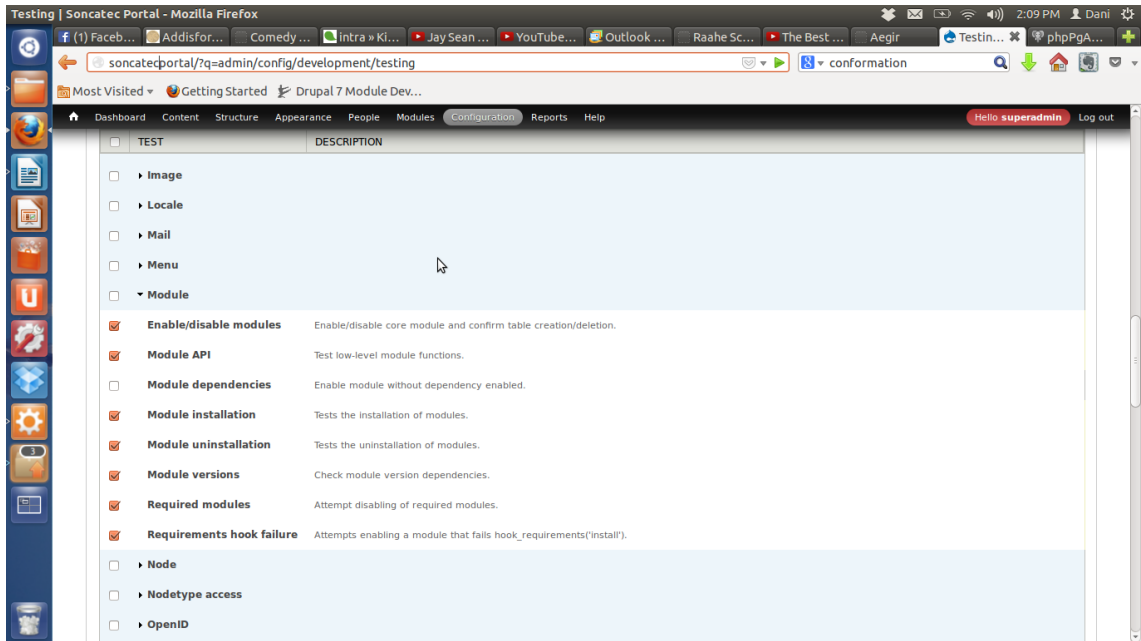


FIGURE 14 List of automated tests to be performed using a testing module

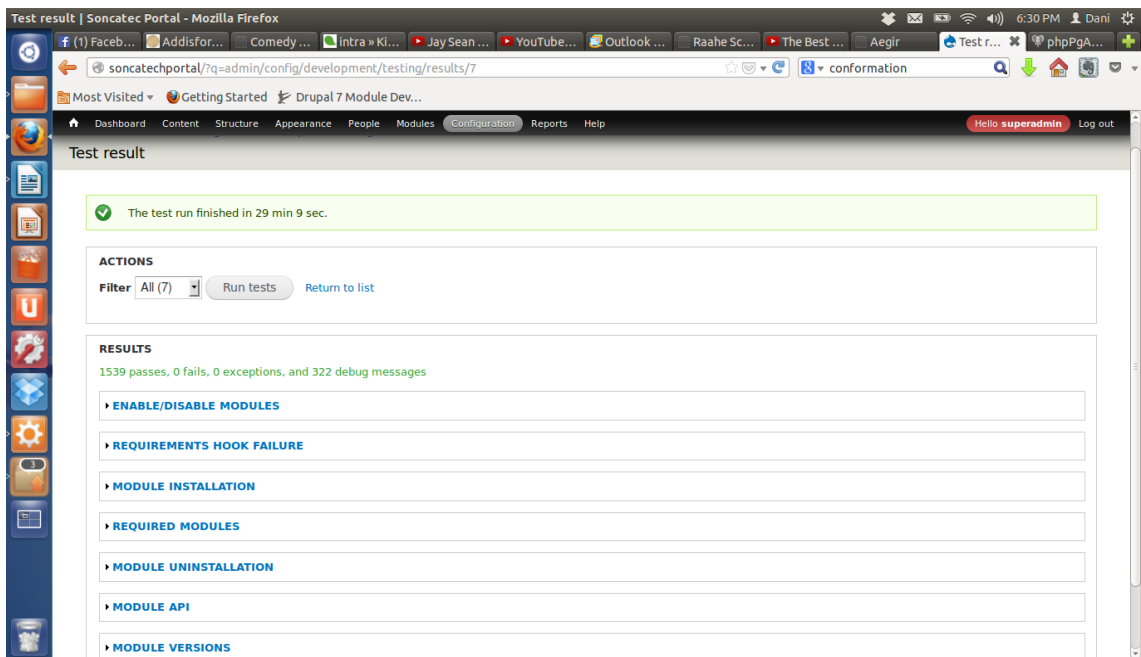


FIGURE 15. Automated test result that shows zero fails



## **6 POSSIBILITIES OF FURTHER DEVELOPMENT**

In this project the creation of a multi-site has been done manually by creating some files, copying and changing settings but it is also possible to make it automatic. That is creating a multi-site at the time of organization registration.

On an organization profile page there is no logo of an organization. If it is added, it will make it easy to administrators to see the logo and know which company profile they are looking at without going through the whole information.

To easily find an organization without looking the whole database, if search is implemented, it will minimize the searching time and database query.

## **7 CONCLUSION**

Generally, everything that has been mentioned on the project description has been implemented. As Soncatec Oy is a service provider company, its customers' needs to register and they are granted a privileged access to access the service. Here the tasks implemented to manage customers are registering, modifying, viewing and deleting organizations.

In addition, assigning staff or users to an organization has also been done. This system will restrict a user or one organization staff to access to other organization's data .Each organization has one staff member with a local admin privilege that will administer only his/her organization portal .Only staff from Soncatec portal has a super admin privilege having the full right on all organizations sites, that is, adding, deleting, modifying, viewing organization and staff profile on each organization.

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