

# CamSafe

A system for monitoring & management of surveillance recordings

## **B2B Documentation and Manual**



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This material is designated for business to business (B2B) use only.

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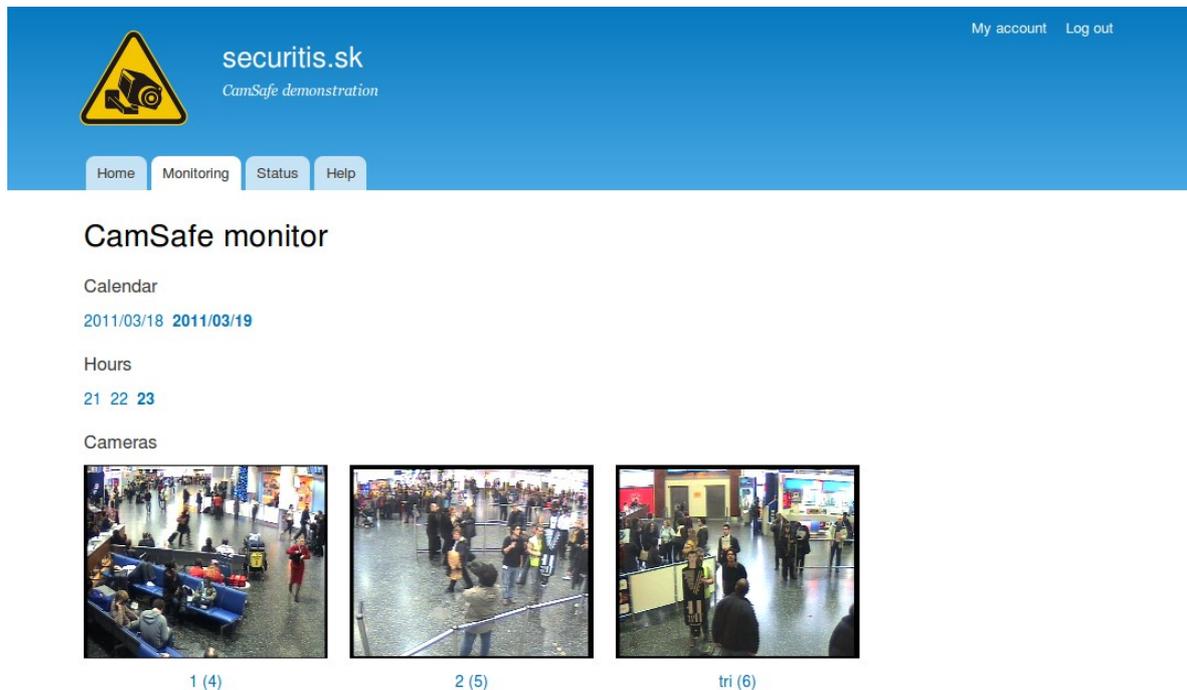
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# Introduction

CamSafe: a system for monitoring & management of surveillance recordings is an archival system designed to securely store digital surveillance recordings for a specified time and view them using standard Web browsers.



The system is highly customizable, the figure above shows the default theme and the view with multiple cameras.

The CamSafe system is based on several technologies. First of all, it is an IP (Internet Protocol) based camera or a video encoding (server) to enable this capability for analog cameras. It is recommended to setup the camera so it uploads a sequence of images (or a video) to the CamSafe FTP (File Transfer Protocol) server as a reaction to an event. The event can be triggered by a clock alarm (e.g. once a second), an external alarm (e.g. PIR sensor) or using the cameras' motion detection feature, which detects a movement in the image.

The recordings uploaded to the CamSafe FTP server are fulfilled with an undeniable timestamp and they are re-organized based on actual user, camera and time to be available to the client when an accident occurs. The re-organization is done asynchronously and it cannot be controlled neither by a user, FTP and WWW server. Recordings then are available

for clients for a defined time (or another limits may be applied).

The client (user) then uses a Web browser to see his recordings organized. She or he can also change their settings and limits. Clients of the system are defined by themselves (limited) or by administrators. Administrators can also set users' limitations and define the system behavior, look and speak.

This material is designated for business to business (B2B) use – it is primarily intended for administrators and system integrators, who are responsible for the system deployment, maintenance and user assistance.

This manual is not intended for CamSafe developers. For the source code study and modification use Doxygen-generated documentation from/and source codes.

## **For CamSafe administrators**

The rest of this document is intended for CamSafe administrators and system integrators. This material expects the basic knowledge of Linux system administration (POSIX Shell, configuration), SQL (Structured Query Language), HTML (HyperText Markup Language) and CSS (Cascading Style Sheets) technologies and appropriate standards. Moreover, the administrator is required to get acquaint with Drupal (<http://drupal.org/handbooks>).

There is described how to deploy a basic version of the CamSafe system in chapter Setup. Before the setup, an aplicability study according to the requirements specified in chapter Requirements must be sucesfully accomplished.

The use cases, capabilities and basic operations are then described in chapter Design and functionality

**Warning:** The administrator is responsible for ensuring enough space on drives!

## **For clients**

This manual is not intended to be used by clients directly.

Clients or system administrators are supposed to configure their browser and IP camera or surveillance server settings according to the specific deployed instance of CamSafe system.

The camera setup part of this manual is not intended to be used as “How to” to enable FTP-based recording of events or streams for a particular device. There are only few examples of the setup in sub-chapter Cameras of the Setup chapter.

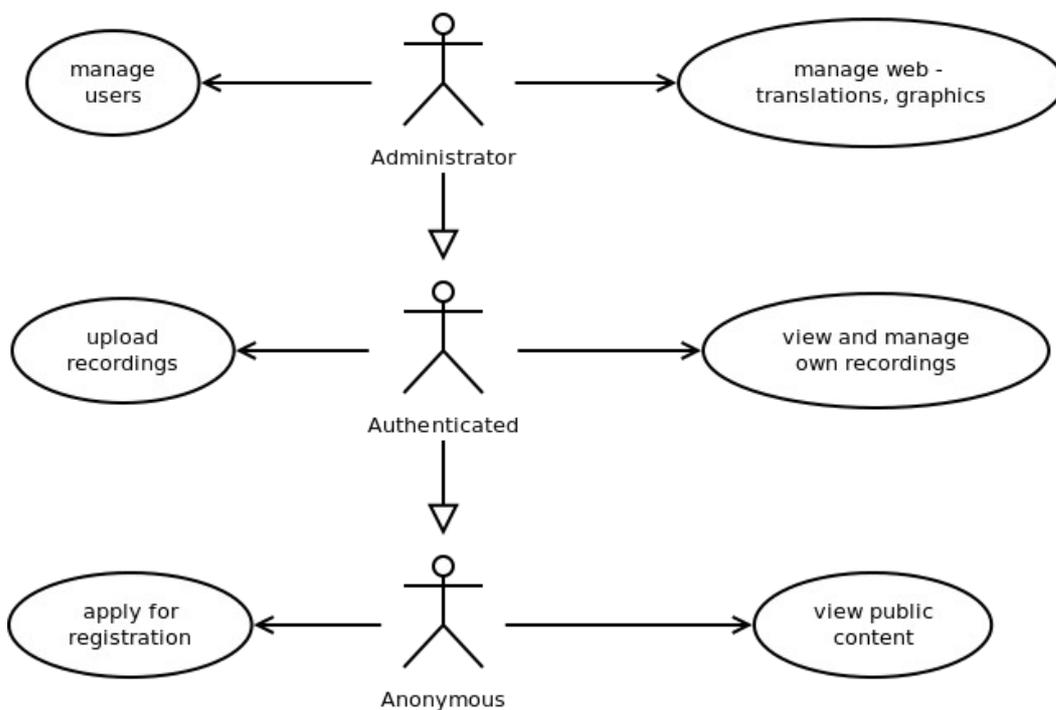
**Warning:** The CamSafe system has an ability to view recorded materials. A client (user) is responsible to applicate the local law regulations concerning CCTV operation, monitoring and archiving.

# Design and functionality

This chapter describes exclusively the CamSafe (server) system for better understanding of administrators and system integrators. It does not cope with system surrounding components such as IP cameras or Web browsers.

The system design can be viewed from multiple aspects. The main aspect are presented hereafter.

## Use cases



The system (use case) consist primarily of roles and actions illustrated above.

There are the following user roles in the system:

- Anonymous user  
can view public pages or sample presentation and she can apply for registration to become the following user
- Authenticated user  
in addition to Anonymous, she can upload recordings to the FTP server. The server organizes the content and allows it to be viewed and managed in case an accident happened, for instance.

- Administrator

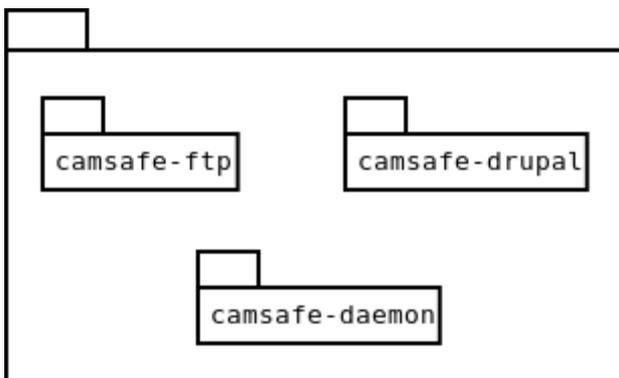
in addition to Registered, the administrator has rights to the user, Web , graphics, translations and the overall system management.

User roles and rights can be managed by administrators through the Web administration interface (using Drupal). Moreover, all users are able to show statistics according to the appropriate role. An administrator is supposed to have root privileges to the operating system.

## The data view

- FTP directory (user specific)
- WWW data directory  
together with the FTP directory should be located on a single volume
- Database is consist of the following schemas
  - public schema to be used by:
    - WWW server (Drupal) – defines users and settings
    - FTP server – access control based on the previous
    - CamSafeD – a monitoring daemonThe public schema is showed in the Setup PostgreSQL sub-chapter.
  - drupal schema to be used by:
    - Drupal – see the Drupal documentation for details.

## The program view



The CamSafe (system) program is composed of illustrated packages. The executive overview of components is described hereafter.

## **CamSafe-FTP**

The FTP monitor script (`camsafe-ftpmonitor.py`) monitors the upload FTP directory using `inotify` (`pyinotify.py`) to catch asynchronous signals “file uploaded” be able to reorganize it to the proper destination folder and eventually create it.

It contains an automatic error recovery mode. It depends on IP, FTP filesystem and runs as a single instance for each user under the `camsafe` role.

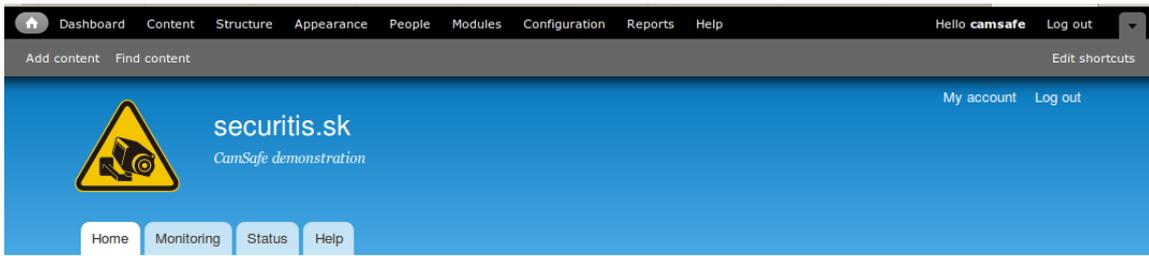
## **CamSafe-Daemon**

The daemon (`camsafe`) is an upstart script (`camsafe.conf`) used to start, stop, restart and to check the status of the daemon engine (`camsafe_monitor.py`). Alternatively, in case of no upstart, it can be run using `camsafe_daemon.py` script (based on PID). Moreover, it collects statistics and provides the maintenance operations, such as deletion outdated recordings and checking other constraints specified per user and per system (settings using Drupal).

It contains an automatic error recovery mode. It has a dependency on Python 3 and Psycopg Python PostgreSQL driver. It runs as the `camsafe` role and can be started by root and `camsafe` roles only.

## **CamSafe-WWW**

The WWW module is a Drupal module containing the following functions and features (screenshots).



## Welcome to securitis.sk

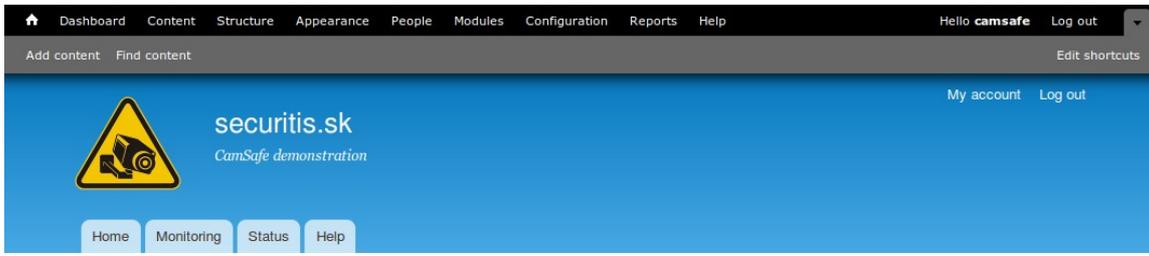
No front page content has been created yet.

- [Add new content](#)

### Main menu

- [Home](#)
- [Monitoring](#)
- [Status](#)
- [Help](#)

**The main Web page** including administration widgets.



## test

- [View](#) [Edit](#) [Shortcuts](#)

### FTP password:

test

### Quota [MB]:

300.00

### Quota [days]:

10

### Quota [cameras]:

3

### User data directory:

/var/www/raid0/test

### Cameras:

vivotek1

axis

vivotek2

**User administration** page for each user. Users can edit only a limited number of settings (e.g. camera names, but not their quotas).

- Navigation
- [CamSafe monitor](#)
  - [CamSafe monitor status](#)
  - ▶ [Forums](#)

### User account

[Create new account](#)
[Log in](#)
[Request new password](#)

Username or e-mail address \*

CAPTCHA

This question is for testing whether you are a human visitor and to prevent automated spam submissions.

Type the two words:

reCAPTCHA™ stop spam, read books

[E-mail new password](#)

**Login** page, forgotten password and registration – using CAPTCHA for human recognition.

### CamSafe monitor

Calendar  
 2011/03/18 **2011/03/19**

Hours  
 21 22 **23**

Cameras



1 (4)

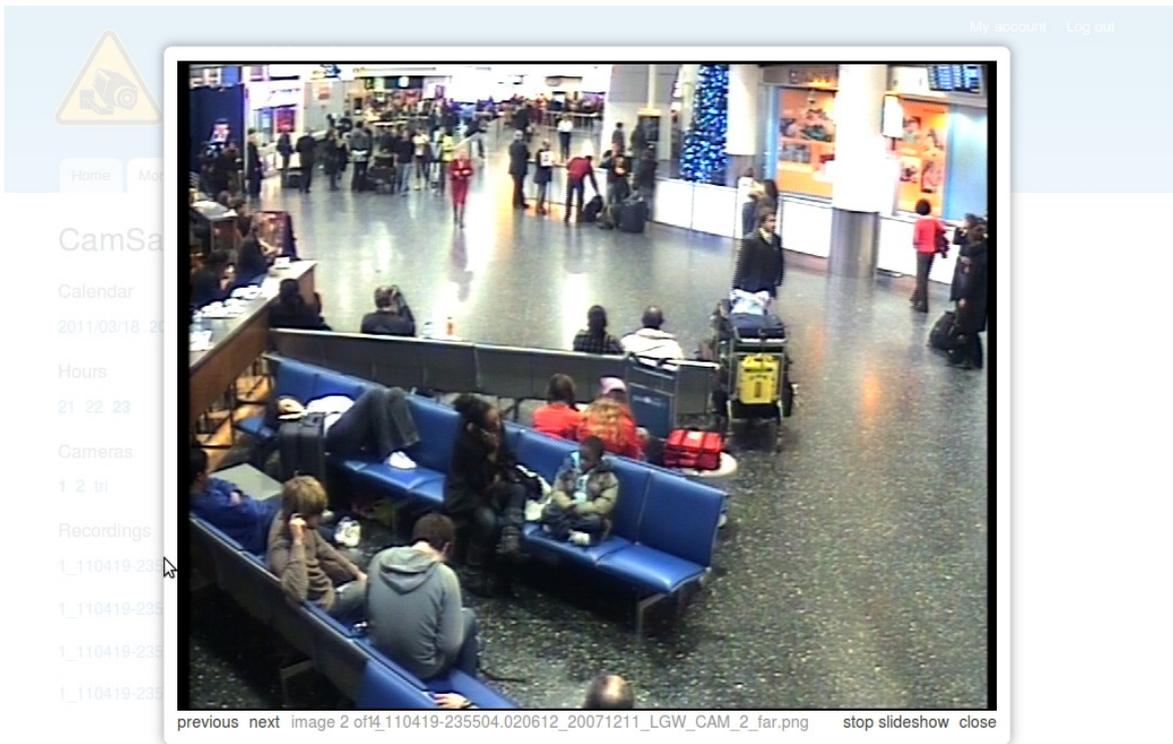


2 (5)

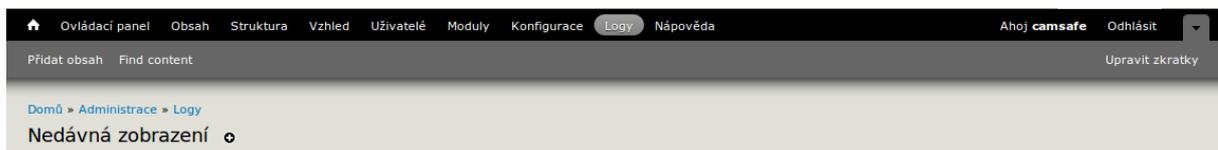


tri (6)

**Setup** – it creates Drupal Field API structures to be capable of a proper functionality (automatically run when enabled in Drupal modules).



**Colorbox** component is the slideshow and is the presentation module front-end. It is based on jQuery javascript components.



**Pro Váš web jsou dostupné bezpečnostní aktualizace. Pro zajištění dostatečné bezpečnosti webu je třeba ihned aktualizovat. Podívejte se na stránku dostupné aktualizace pro více informací a nainstalujte chybějící aktualizace.**

Tato stránka zobrazuje poslední přístupy.

ČASOVÉ RAZITKO	STRÁNKA	UŽIVATEL	OPERACE
05/31/2011 - 16:37	Přístup byl zamítnut <a href="#">admin/reports/hits</a>	<a href="#">camsafe</a>	<a href="#">detaily</a>
05/31/2011 - 16:37	Přístup byl zamítnut <a href="#">admin/reports/hits</a>	Anonymous (neověřeno)	<a href="#">detaily</a>
05/31/2011 - 16:30	User account <a href="#">user/password</a>	Anonymous (neověřeno)	<a href="#">detaily</a>
05/31/2011 - 16:30	User account <a href="#">user/register</a>	Anonymous (neověřeno)	<a href="#">detaily</a>
05/31/2011 - 16:30	Welcome to securitis.sk <a href="#">node</a>	Anonymous (neověřeno)	<a href="#">detaily</a>
05/31/2011 - 16:30	Log out <a href="#">user/logout</a>	Anonymous (neověřeno)	<a href="#">detaily</a>
05/31/2011 - 16:30	Welcome to securitis.sk <a href="#">node</a>	<a href="#">camsafe</a>	<a href="#">detaily</a>

**Statistics** – shows different statistics for different roles and users.

# Requirements

This chapter contains the description of CamSafe system expectations and prerequisites. The study of applicability according the following requirements must be performed before a system deployment.

## Functional requirements

These requirements are provided by the CamSafe system.

- An overview of archives of individual cameras recordings
- Storage (database) design and optimization
- Live-stream address configuration
- Securing the system
- The user interface – optimized for various browsers (IE7+, FF2+, O9+)
- User registration and management, including various quotas
- Internalization
- Statistics
- Testing of conformity of cameras and the user interface

## Server requirements

These requirements are required by the CamSafe system.

### Operating system

- Linux 2.6 or above (POSIX)
- Debian/Ubuntu upstart (service) recommended
- Firewall (iptables/UFW)
- root access

### File system

- EXT4 or newer
- must able to record changes in fractions of seconds (hundreds at least)

### FTP server

- PROFTP 1.3.3a-6squeeze1 or newer

- FTP server NEVER runs any application
- Accounts configuration using a database  
<http://www.debuntu.org/how-to-ftp-virtual-host-with-proftpd-mysql>
- Logging (on)
- There is necessary to have a user disk quota for the case of disk full and in the case of system failure
- FTP and WWW-data are recommended to be located on a single logical drive
- Read only users' root directory – only specific cameras are allowed  
[http://www.proftpd.org/docs/directives/linked/config\\_ref\\_DefaultRoot.html](http://www.proftpd.org/docs/directives/linked/config_ref_DefaultRoot.html)
- Optional: maximum number of connections, IP (range) check etc.

## Database

- PostgreSQL 8.4 or newer
- It is advantageous to use triggers and asynchronous messaging in case of immediate change reflection
- CamSafe uses LISTEN/NOTIFY functionality (optional)
- MySQL 5+ in the case of PostgreSQL missing (limited support)

## Programming languages

- Bash shell
- Python 3.1 or 3.2  
Pyinotify functionality (embedded for Python 3)
- PHP 5.3 or above  
INI configuration: memory at least 64M  
Debug: error\_reporting = E\_ALL | E\_STRICT;  
Production: E\_ALL & ~E\_DEPRECATED

## Web server

- Apache 2
- WWW server NEVER runs any other application
- Can read recordings (raid mount)
- WWW server has not a right to write or modify recordings
- Optional: ModSecurity application firewall
- Optional: individual .htaccess settings (for corporate users)

## CMS system

- Drupal 7
- Automatic update (cron)

- Modules (enabled): Field, Field SQL storage, jQuery Update, jQueryUI
- Colorbox (actual version)
- More detailed requirements are to be found in the Setup chapter

## **Client**

- Standard browser (Internet Explorer, Firefox, Opera)
- Java Script enabled
- jQuery 1.5 and AJAX capable
- Optional: video playback player supporting MPEG4 codeck (for video playback functionality)

## **IP capable cameras**

- Any IP capable camera or video encoder (server) encoder with the ability to upload to FTP. For example. AXIS, Panasonic, Vivotek, LevelOne IP cameras and/or IP capable video encoding servers (both for digital and analog cameras)
- Optional: static (routable) Ipv4 address
- Connected to the Internet (as all components above)

# Setup

The following chapter is designated to lead a system administrator with root privileges through the CamSafe system setup. The manual expects the basic knowledge of Linux system administration – POSIX Shell. POSIX Shell is based on the standard defined in Portable Operating System Interface (POSIX) – IEEE P1003.2. and second, of SQL – Structured Query Language, described e.g. in ISO/IEC 9075-1:2008: Information technology – Database languages – SQL – Part 1: Framework (SQL/Framework). Moreover, we recommend to get acquainted with Drupal (<http://drupal.org/documentation>).

## Common abbreviations:

```
$ shell command
> (p)sql query
# comment
  (no symbol) – an (above) symbol continues
```

## Linux

```
# Tested on:
```

```
i686 GNU/Linux debian 2.6.32
```

```
x86_64 GNU/Linux 2.6.35 debian-based: Ubuntu
```

```
$ groupadd -g 9001 camsafe
```

```
$ useradd -s /bin/bash -d /var/ftp -c "CamSafe monitor" --uid 9001 -g camsafe camsafe
```

```
$ cp CamSafe_monitor/camsafe/* /usr/local/camsafe/
```

```
# Do not forget to change settings in camsafe_monitor.py
```

```
$ cp CamSafe_monitor/upstart/camsafe.conf /etc/init.d/
```

```
# $ ln -s ... /etc/init.d/upstart ... /etc/rc?.d
```

```
$ cp www /var/www
```

## PostgreSQL

```
<https://help.ubuntu.com/community/PostgreSQL>
```

```
### nano /etc/apt/sources.list # deb http://backports.debian.org/debian-backports squeeze-backports main contrib non-free # aptitude update
```

```
# aptitude -t squeeze-backports install postgresql-9.0 postgresql-client-9.0 php5-pgsql
```

```
$ sudo su postgres
```

```
$ psql
```

```
> \password postgres
```

```
$createuser -D -A -P camsafe
```

```
# keep the password here!
```

```
$ createdb -O camsafe camsafe
```

```
db camsafe
```

```
$ nano /etc/postgresql/*/main/pg_hba.conf
```

```
# "local" is for Unix domain socket connections only
```

```
local all all md5
```

```
# IPv4 local connections:
```

```
host all all 127.0.0.1/32 md5
```

```
# IPv6 local connections:
```

```
host all all ::1/128 md5
```

```
$ service postgresql restart
```

```
$ psql -U camsafe camsafe
```

```
> CREATE SCHEMA drupal;
```

```
# or just import a backup... $ pg_restore -d camsafe /tmp/camsafe.sql.tar.gz
```

## **ProFTPD**

```
<http://www.proftpd.org/docs/howto/SQL.html>
```

```
> CREATE TABLE users (  
    userid VARCHAR(30) NOT NULL PRIMARY KEY,  
    passwd VARCHAR(80) NOT NULL,  
    uid INTEGER NOT NULL,  
    gid INTEGER,  
    homedir VARCHAR(255),  
    shell VARCHAR(255)
```

```

);

> CREATE TABLE groups (
    groupname VARCHAR(30) NOT NULL,
    gid INTEGER NOT NULL,
    members VARCHAR(255)
);

> INSERT INTO groups (groupname, gid, members) VALUES ('camsafe-ftp', 9001, 'camsafe-
ftp');
> INSERT INTO users (userid, passwd, uid, gid, homedir, shell)
    VALUES ('test', 'password', 9001, 9001, '/var/ftp/test', '/bin/false');
> INSERT INTO users VALUES ('www', 'password', 33, 9003, '/var/www', '/bin/false');

$ aptitude install proftpd-mod-pgsql
# install inetd more likely (slower, but users and processes are separated)

$ mkdir ftp
$ chown camsafe ftp

$ nano /etc/proftpd/sql.conf
SQLBackend      postgres
SQLEngine       on
SQLAuthenticate on
SQLAuthTypes    Plaintext
SQLMinUserUID   9000
SQLMinUserGID   9000
# database[@hostname][:port] [username] [password] [policy]
SQLConnectInfo  camsafe camsafe >>password<<
SQLUserInfo     users userid passwd uid gid homedir shell
SQLGroupInfo    groups groupname gid members

$ nano /etc/proftpd/modules.conf
LoadModule      mod_sql.c
LoadModule      mod_sql_postgres.c

$ nano /etc/proftpd/proftpd.conf
DefaultRoot     ~
RequireValidShell off

```

```
Include /etc/proftpd/sql.conf
```

```
$ service proftpd restart
```

```
$ ftp
```

```
test
```

## **Drupal**

```
$ aptitude install php5-pgsql
```

```
$ a2enmod ssl
```

```
$ a2ensite default-ssl
```

```
$ service apache2 restart
```

```
$ wget drupal7 # from drupal.org
```

```
$ cd sites/default && mkdir files
```

```
$ cp default.settings.php settings.php
```

```
$ chmod o+w files settings.php
```

```
Run setup...
```

```
DB: localhost camsafe camsafe >>password<<
```

```
Prefix: drupal.
```

```
$ chmod o-w settings.php
```

```
$ ln -s raid0 / mnt ... raid0
```

```
$ chown camsafe raid0
```

```
# cp camsafe theme and module...
```

```
$ cd themes && ln -s ../camsafe/theme camsafe
```

```
$ cd modules && ln -s ../camsafe camsafe
```

```
People / add: test@example.com
```

**Reboot to make the system run** if it doesn't (upstart).

# Cameras

The following sub-chapter shows a basic configuration of tested cameras.

## Axis 207MW

The screenshot shows the 'Event Settings' page for an Axis 207MW Network Camera. The page is divided into a left sidebar with navigation options and a main content area for configuration. The sidebar includes 'Basic Configuration', 'Video & Image', 'Audio', 'Live View Config', 'Event Config' (with 'Event Settings' selected), 'System Options', and 'About'. The main content area has a top header with the Axis logo, the camera model name, and links for 'Live View', 'Setup', and 'Help'. The 'Event Settings' section is titled and includes a help icon. It contains several sections: 'Event enabled' (checked), 'Triggered by...' (with 'Motion detection' checked and 'Input port' and 'Manual trigger' unchecked), 'When Triggered...' (with 'Upload images/video' checked), and 'File format' (set to 'JPEG image(s)'). There are also settings for 'Include pre-trigger buffer' and 'Include post-trigger buffer', both with their respective image frequencies. At the bottom, there are options for 'Activate output port', 'Send HTTP notification', and 'Send TCP notification', all of which are unchecked. 'Save' and 'Reset' buttons are located at the bottom right of the configuration area.

**AXIS 207MW Network Camera** Live View | Setup | Help

**Event Settings** ?

Event enabled

**Triggered by...**

Input port when port is Active ▾

Manual trigger

Motion detection

In window: - DefaultWindow ▾ when motion starts ▾

Audio trigger

**When Triggered...**

Upload images/video

Select upload type: FTP ▾

Primary FTP server settings... Secondary FTP server settings...

File format: JPEG image(s) ▾

Include pre-trigger buffer 2 second(s) ▾

Image frequency 1 frame(s) per second ▾

Include post-trigger buffer 9 second(s) ▾

Image frequency 1 frame(s) per second ▾

Create folder: \*

Base file name: \*

\* [See help for more information.](#)

Add date/time suffix

Add sequence number suffix (no maximum value)

Add sequence number suffix up to 0 and then start over

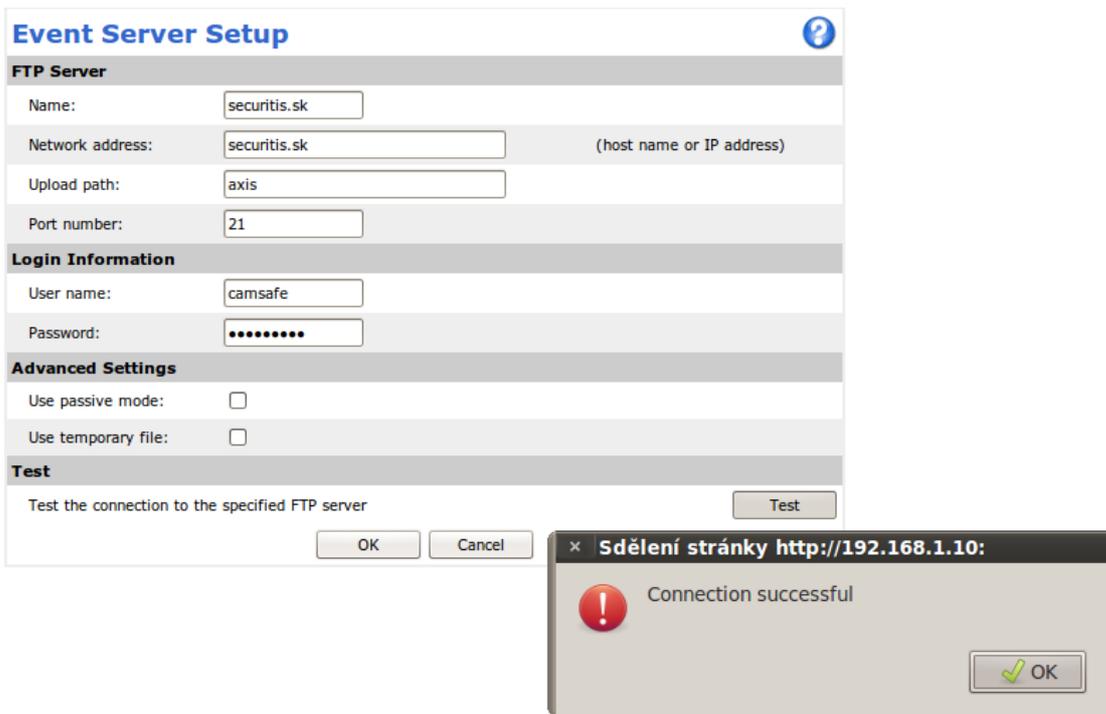
Use own file name format. [See help for more information.](#)

Activate output port

Send HTTP notification

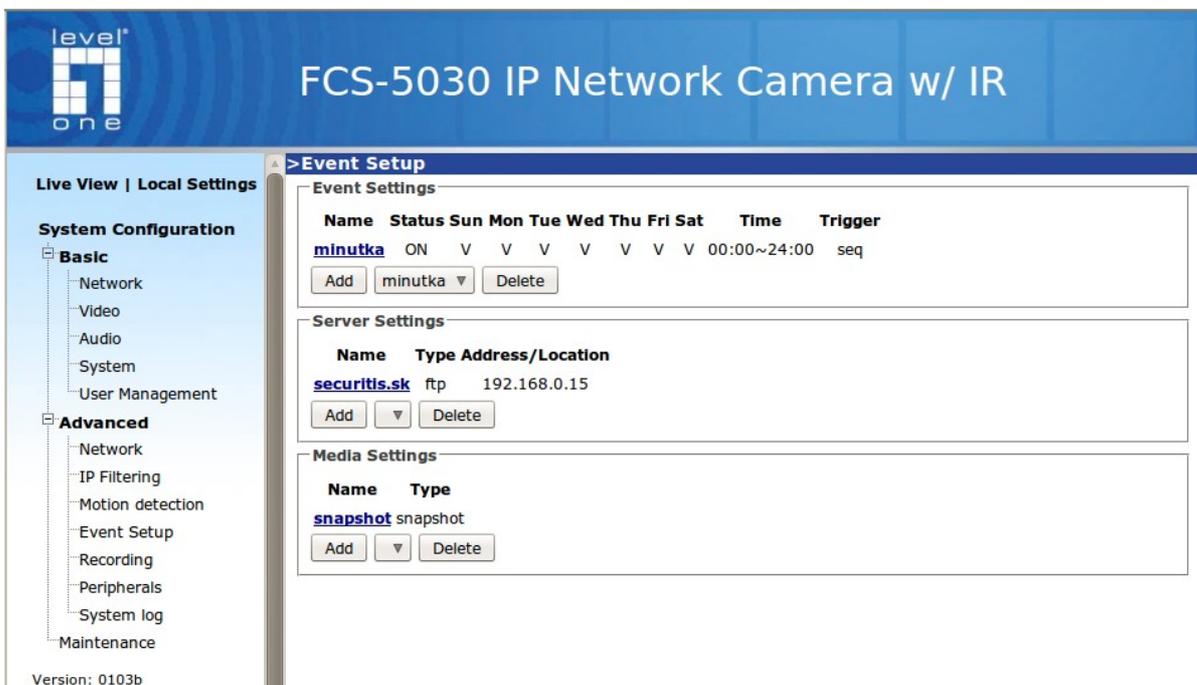
Send TCP notification

Save Reset



## LevelOne FCS-5030 and Vivotek IP8332

Both cameras have equivalent software. Use menu item Event Setup for the LevelOne camera and Application in advanced menu for the Vivotek camera.



http://localhost:10017

VIVOTEK  
www.vivotek.com

Configuration

## >Application

- Home
- System
- Security
- HTTPS
- SNMP
- Network
- DDNS
- Access list
- Video
- Motion detection
- Camera tampering detection
- Homepage layout
- Application**
- Recording
- Local storage
- System log
- View parameters
- Maintenance
- [ Basic mode ]

### Event Settings

Name	Status	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Time	Trigger
<a href="#">Video-securitis</a>	ON	V	V	V	V	V	V	V	00:00~24:00	motion

### Server Settings

Name	Type	Address/Location
<a href="#">securitis.sk</a>	ftp	192.168.0.15
<a href="#">ugolog</a>	ftp	ftp.ugolog.com
<a href="#">securitystation</a>	ftp	upload0.mysecuritystation.com

### Media Settings

Available memory space: 10088KB

Name	Type
<a href="#">snapshot</a>	snapshot
<a href="#">Video</a>	videoclip

### Customized Script

Name	Date	Time
------	------	------

http://localhost:10018

## System statistics

For system statistics use:

\$ sar -A

\$ df -h

\$ du -h

\$ htop

# Licenses

CamSafe

A system for monitoring & management of surveillance recordings.

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