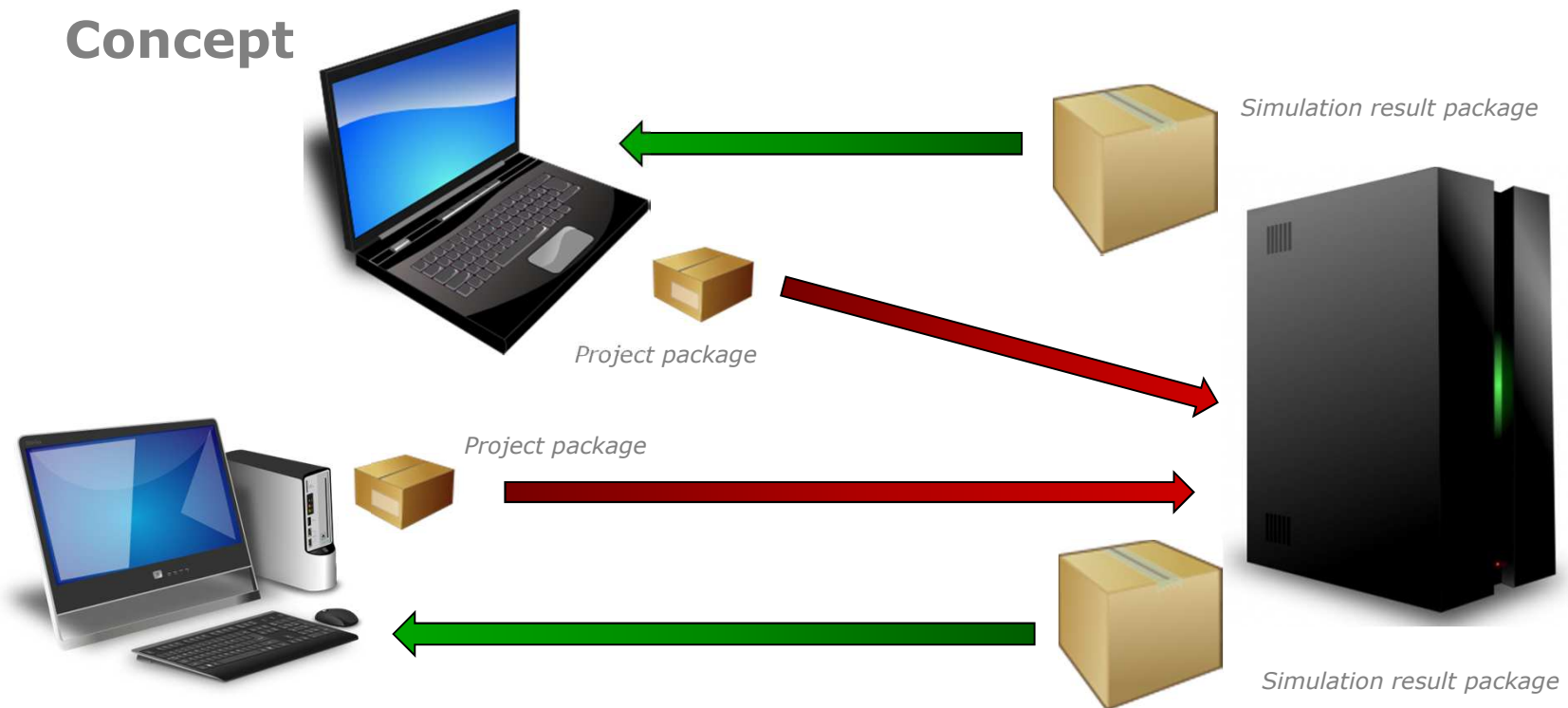


Remote Solver Server

User Guide and Reference

Andreas Nicolai, TU Dresden, 29.10.2013

Concept



- Users setup their individual simulation projects on own computers
- Transmit jobs via client interface to server
- Collect simulation results once done

Server Functionality

- Server manages jobs of many users, login required (one admin account supported)
- Jobs are queued into either slow or fast job queues:
 - slow: jobs can take a long time to complete, hence no time limit
 - fast: jobs have at maximum 30 minutes wall clock time, if time limit is exceeded, jobs are terminated by server
- User commands for job management:

request status	user queries solver for status of own jobs
kill job	terminate own job that is currently running
remove job	remove queued/finished job
download results	download simulation results package

Simulation Projects/Jobs are directories with simulation input data

Example:

```
Hamstad_BM_No4/  
  Hamstad_BM_No4-5.6.8_Kirchhoff.dpj  
  Hamstad_BM_No4-5.6.8_K1.dpj  
  pa_i.ccd  
  rain_5.6.8.ccd  
  Teq_e.ccd
```

← Job must contain exactly one top-level directory

← The project file must reside in this directory, several project files can be in the directory.

} Additional files for the project can be in top-level directory and/or other subdirectories

Another example (with subdirectories):

```
Hamstad_BM_No4_D6/  
  materials/  
    HamstadBenchmark4Finishingmaterialatinside_16777218.m6  
    HamstadBenchmark4Loadbearingmaterial_16777217.m6  
  climate/  
    pa_i.ccd  
    Teq_e.ccd  
    water_5.6.8.ccd  
  Hamstad_BM_No4-6.0.0_K1.d6p
```

Project directories are then compressed into a zip-archive which is transmitted to the server.

When submitting a job, user needs to specify:

- Job queue (fast/slow)
- Zip-file with project directory, e.g.:

`Hamstad_BM_No4-D6.zip`

- Project file name to use for simulation, e.g.:

`Hamstad_BM_No4-6.0.0_K1.d6p`

- Simulation Solver ID:

`Delphin_6.0`

- Additional command line arguments, e.g.:

`--verbosity-level=1 --LES-Solver=BTridiag`

Simulation Result Packages are [zip-Files](#) with original directory structure, now also containing results (result folders)

Example

```
Hamstad_BM_No4/  
  Hamstad_BM_No4-5.6.8_Kirchhoff.dpj  
  Hamstad_BM_No4-5.6.8_K1.dpj  
  pa_i.ccd  
  rain_5.6.8.ccd  
  Teq_e.ccd  
  Hamstad_BM_No4-5.6.8_K1.results/
```

← Directory with simulation results

Another example:

```
Hamstad_BM_No4_D6/  
  materials/  
    HamstadBenchmark4Finishingmaterialatinside_16777218.m6  
    HamstadBenchmark4Loadbearingmaterial_16777217.m6  
  climate/  
    pa_i.ccd  
    Teq_e.ccd  
    water_5.6.8.ccd  
  Hamstad_BM_No4-6.0.0_K1.d6p  
  Hamstad_BM_No4-6.0.0_K1/
```

← Directory with simulation results

The Generic Client

Generic Remote Solver Client

Server (IP-Address): localhost

Port: 10000

User: ghorwin

Password: *****

Project file: corner2D.dpj

Zip file: /home/ghorwin/Documents/svn/RemoteSolverServer_trunk/test/corner2DProject.zip

Solver: Delphin 5.6

Command line:

Job type (queue): ☐ Fast (max. 30 min) ☒ Slow

Buttons: Login, Logout, Show Password, Select project..., Select zip..., Submit Job

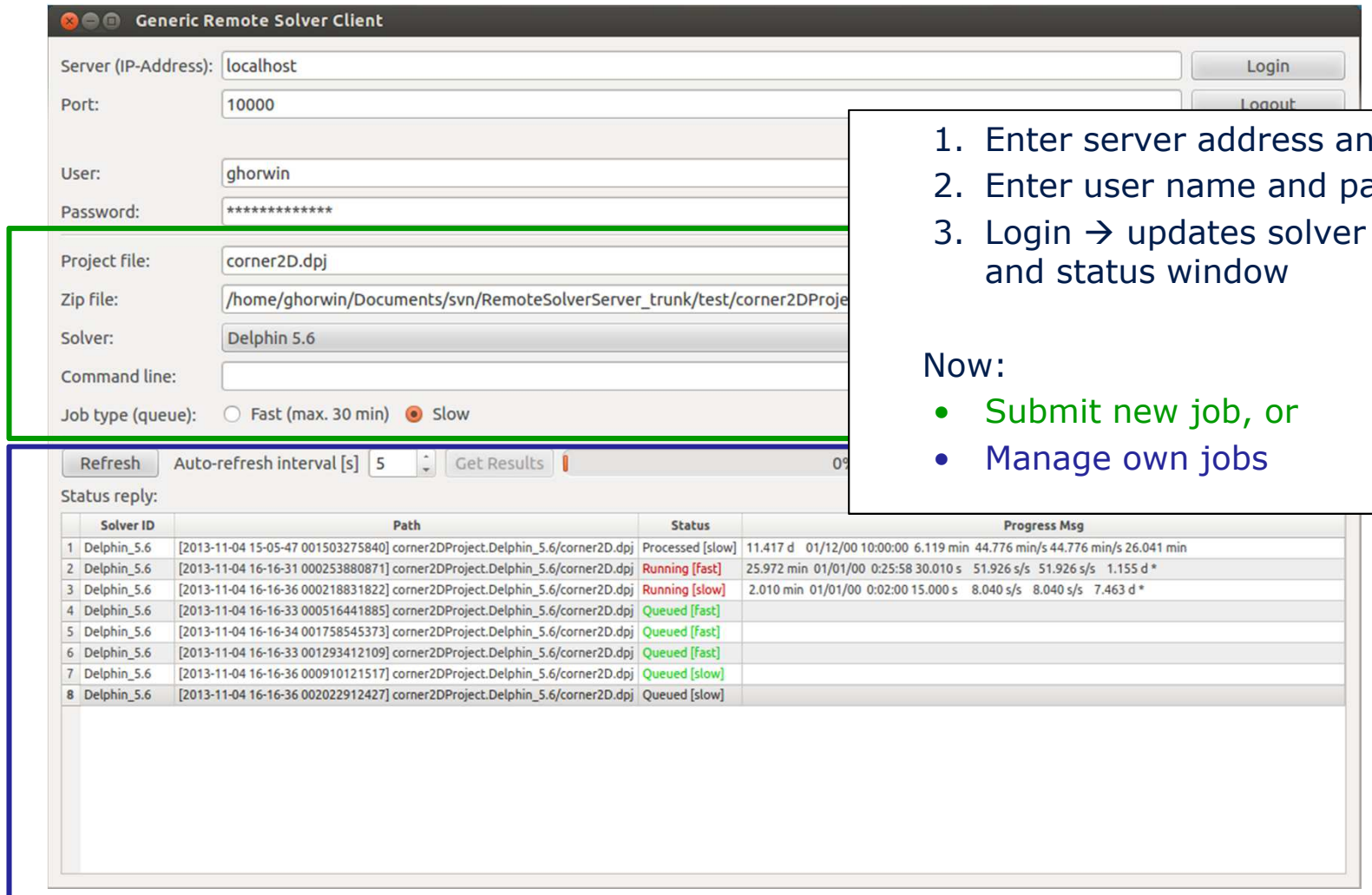
Refresh Auto-refresh interval [s] 5 Get Results 0% Kill Remove

Status reply:

	Solver ID	Path	Status	Progress Msg
1	Delphin_5.6	[2013-11-04 15-05-47 001503275840] corner2DProject.Delphin_5.6/corner2D.dpj	Processed [slow]	11.417 d 01/12/00 10:00:00 6.119 min 44.776 min/s 44.776 min/s 26.041 min
2	Delphin_5.6	[2013-11-04 16-16-31 000253880871] corner2DProject.Delphin_5.6/corner2D.dpj	Running [fast]	25.972 min 01/01/00 0:25:58 30.010 s 51.926 s/s 51.926 s/s 1.155 d *
3	Delphin_5.6	[2013-11-04 16-16-36 000218831822] corner2DProject.Delphin_5.6/corner2D.dpj	Running [slow]	2.010 min 01/01/00 0:02:00 15.000 s 8.040 s/s 8.040 s/s 7.463 d *
4	Delphin_5.6	[2013-11-04 16-16-33 000516441885] corner2DProject.Delphin_5.6/corner2D.dpj	Queued [fast]	
5	Delphin_5.6	[2013-11-04 16-16-34 001758545373] corner2DProject.Delphin_5.6/corner2D.dpj	Queued [fast]	
6	Delphin_5.6	[2013-11-04 16-16-33 001293412109] corner2DProject.Delphin_5.6/corner2D.dpj	Queued [fast]	
7	Delphin_5.6	[2013-11-04 16-16-36 000910121517] corner2DProject.Delphin_5.6/corner2D.dpj	Queued [slow]	
8	Delphin_5.6	[2013-11-04 16-16-36 002022912427] corner2DProject.Delphin_5.6/corner2D.dpj	Queued [slow]	

Job status list

The Generic Client - Workflow



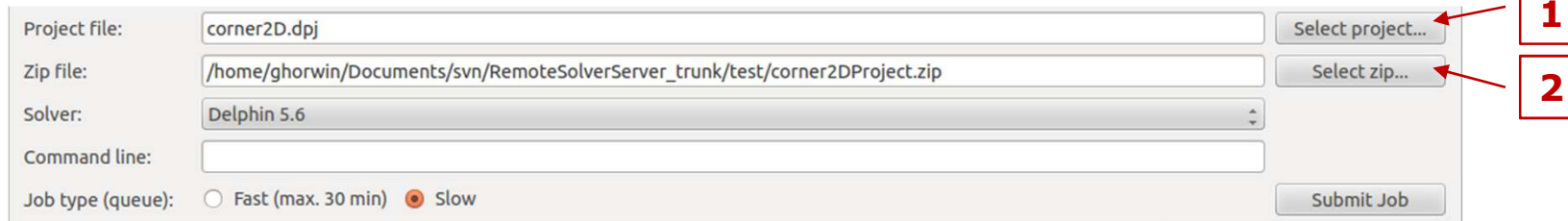
The screenshot shows the 'Generic Remote Solver Client' window. The 'Login' section at the top includes fields for 'Server (IP-Address): localhost', 'Port: 10000', 'User: ghorwin', and 'Password: *****'. Below this, a green box highlights the job configuration section, which includes 'Project file: corner2D.dpj', 'Zip file: /home/ghorwin/Documents/svn/RemoteSolverServer_trunk/test/corner2DProj...', 'Solver: Delphin 5.6', 'Command line:', and 'Job type (queue): ☐ Fast (max. 30 min) ☒ Slow'. Below the green box, a blue box highlights the 'Status reply' section, which includes a 'Refresh' button, an 'Auto-refresh interval [s]' set to 5, and a 'Get Results' button. The 'Status reply' section contains a table with columns: Solver ID, Path, Status, and Progress Msg.

	Solver ID	Path	Status	Progress Msg
1	Delphin_5.6	[2013-11-04 15-05-47 001503275840] corner2DProject.Delphin_5.6/corner2D.dpj	Processed [slow]	11.417 d 01/12/00 10:00:00 6.119 min 44.776 min/s 44.776 min/s 26.041 min
2	Delphin_5.6	[2013-11-04 16-16-31 000253880871] corner2DProject.Delphin_5.6/corner2D.dpj	Running [fast]	25.972 min 01/01/00 0:25:58 30.010 s 51.926 s/s 51.926 s/s 1.155 d *
3	Delphin_5.6	[2013-11-04 16-16-36 000218831822] corner2DProject.Delphin_5.6/corner2D.dpj	Running [slow]	2.010 min 01/01/00 0:02:00 15.000 s 8.040 s/s 8.040 s/s 7.463 d *
4	Delphin_5.6	[2013-11-04 16-16-33 000516441885] corner2DProject.Delphin_5.6/corner2D.dpj	Queued [fast]	
5	Delphin_5.6	[2013-11-04 16-16-34 001758545373] corner2DProject.Delphin_5.6/corner2D.dpj	Queued [fast]	
6	Delphin_5.6	[2013-11-04 16-16-33 001293412109] corner2DProject.Delphin_5.6/corner2D.dpj	Queued [fast]	
7	Delphin_5.6	[2013-11-04 16-16-36 000910121517] corner2DProject.Delphin_5.6/corner2D.dpj	Queued [slow]	
8	Delphin_5.6	[2013-11-04 16-16-36 002022912427] corner2DProject.Delphin_5.6/corner2D.dpj	Queued [slow]	

1. Enter server address and port
2. Enter user name and password
3. Login → updates solver ID list and status window

Now:

- Submit new job, or
- Manage own jobs



Project file: **1**

Zip file: **2**

Solver:

Command line:

Job type (queue): ☐ Fast (max. 30 min) ☒ Slow

1

Select a simulation **project file** within a directory structure:

- *Zip-Archive with project directory is automatically created and shown in "Zip file:" input line*

- or -

2

Select an existing archive with simulation project directory structure:

- *After selecting archive, the corresponding **project file** within zipped directory must be entered in "Project file:" input line (DO NOT use "Select project..." now)*

Then select **Solver**, specify **additional command line options**, select **Job type (queue)** and send the job to the server (**Submit Job**).

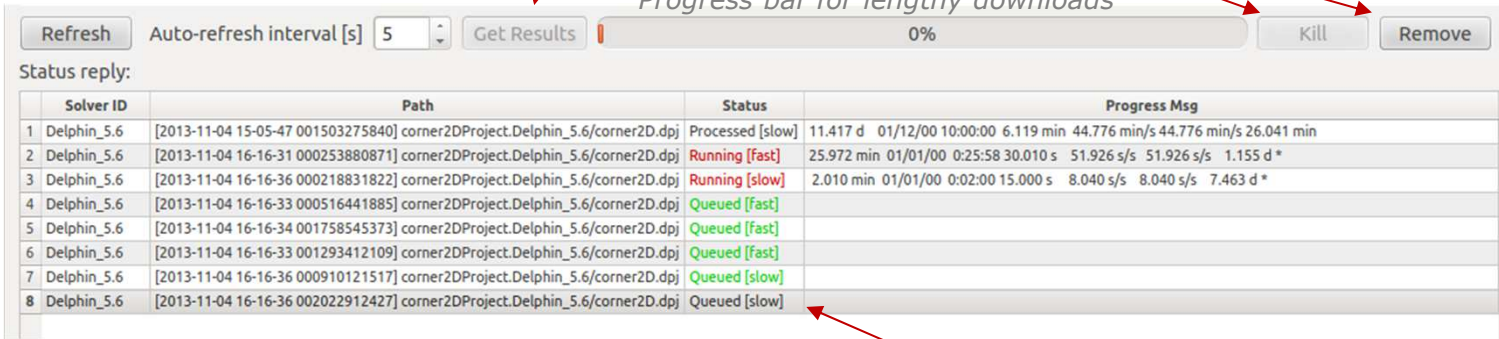
Solver command line:

```
solver <project directory>/<project file> <additional command line options>
```

The Generic Client – Job Management

Project management commands

Progress bar for lengthy downloads



Status reply:

	Solver ID	Path	Status	Progress Msg
1	Delphin_5.6	[2013-11-04 15-05-47 001503275840] corner2DProject.Delphin_5.6/corner2D.dpj	Processed [slow]	11.417 d 01/12/00 10:00:00 6.119 min 44.776 min/s 44.776 min/s 26.041 min
2	Delphin_5.6	[2013-11-04 16-16-31 000253880871] corner2DProject.Delphin_5.6/corner2D.dpj	Running [fast]	25.972 min 01/01/00 0:25:58 30.010 s 51.926 s/s 51.926 s/s 1.155 d *
3	Delphin_5.6	[2013-11-04 16-16-36 000218831822] corner2DProject.Delphin_5.6/corner2D.dpj	Running [slow]	2.010 min 01/01/00 0:02:00 15.000 s 8.040 s/s 8.040 s/s 7.463 d *
4	Delphin_5.6	[2013-11-04 16-16-33 000516441885] corner2DProject.Delphin_5.6/corner2D.dpj	Queued [fast]	
5	Delphin_5.6	[2013-11-04 16-16-34 001758545373] corner2DProject.Delphin_5.6/corner2D.dpj	Queued [fast]	
6	Delphin_5.6	[2013-11-04 16-16-33 001293412109] corner2DProject.Delphin_5.6/corner2D.dpj	Queued [fast]	
7	Delphin_5.6	[2013-11-04 16-16-36 000910121517] corner2DProject.Delphin_5.6/corner2D.dpj	Queued [slow]	
8	Delphin_5.6	[2013-11-04 16-16-36 002022912427] corner2DProject.Delphin_5.6/corner2D.dpj	Queued [slow]	

First select project in job list

Refresh

- Updates the job list (done automatically when auto-refresh interval is > 0)

Get Results (only for processed/finished jobs):

- Download simulation result package

Kill (only for running jobs):

- Stop/terminate running solver

Remove (only for queued and processed jobs):

- Remove project from server, should be done after results download

Server Reference

Prerequisites

- dedicated user account for server with access to data root directory and solver binaries (see next slide)
- tools `zip` and `unzip` in system path (executable by server user)
- open firewall for server port (incoming/outbound traffic)

Installation of server executable:

`/usr/local/bin/RemoteSolverServer`



Binary install path, may also be /usr/bin or /home/xxx/bin

Server data directory (server user needs full access):

`/srv/rss/...`



*Server data root (compile-time constant **SERVER_DATA_ROOT**)*

Data directory structure:

<code><data root>/config</code>	configuration files
<code><data root>/log</code>	server logs
<code><data root>/queue</code>	queued projects
<code><data root>/running</code>	currently running projects
<code><data root>/processed</code>	finished/processed projects

Configuration file: `<data root>/config/config.ini`


```
;Remote Solver Server Configuration File
```

```
[CPU]
```

```
CPU_count_fast      = 3
```

```
CPU_count_slow      = 1
```

Defines number of solvers in each queue
that are run concurrently



```
;Server IDs and corresponding binaries, server user needs execute permissions for listed binaries
```

```
[Solver]
```

```
Delphin_5.6          = /home/ghorwin/delphin_5.6/exec/delphin_solver
```

```
Delphin_6.0          = /home/ghorwin/delphin_6.0/bin/release/d6solver
```

```
EnergyPlus_6.0.0     = /home/ghorwin/ep600/EnergyPlus
```

```
EnergyPlus_7.1.0     = /home/ghorwin/ep710/EnergyPlus
```

```
Nandrad_1.0          = /home/ghorwin/nandrad/bin/release/nandrad
```

```
[TimerSettings]
```

```
;Time interval in seconds for checking if running jobs are finished and starting queued jobs
```

```
UpdateInterval = 60
```

```
; Time allowed for fast jobs to run in seconds
```

```
FastCPUTimeOut = 1800
```

```
[Server]
```

```
; path to private key file, relative to config directory (only for ssh protocol)
```

```
PrivateKey = crt/server.key
```

```
; path to certificate, relative to config directory (only for ssh protocol)
```

```
Certificate = crt/server.crt
```

```
; Port for solver to listen on
```

```
Port = 10000
```

User credentials file: `<data root>/config/digest.file`

```
admin:rss:9999:63a9f0ea7bb98050796b649e85481805
fechner:rss:1:a09ade43f73852ccb3a28576e3946620
ghorwin:rss:10:3e0538bb6d487c487a4175c340bfba0
stvo:rss:15:d94c9ff3ff82d884cdc768453e3cdf0e
```

ID 9999 reserved for privileged admin account
(**compile-time constant ADMIN_USER_ID**)

ghorwin:rss:10:3e0538bb6d487c487a4175c340bfba0

user name

ID Number

MD5 hash of password

Generating MD5 hashes/changing passwords

- Run RemoteSolverServer with `--md5-hash` option (does not start the server).

```
> RemoteSolverServer --md5-hash=mySecret342#!-2password
3b1c1c0a02076075837d1c6a634614d7
```

Remote Solver Server

User Guide and Reference

Andreas Nicolai, TU Dresden, 29.10.2013