Virtual Machine Cloud Service

Inhaltsverzeichnis

Introduction

System Requirements

Server:

On the server side a Linux operating system will be required. In this example a single machine implementation is required for testing purpose. Therefore Ubuntu 14.04.1 LTS with devstack setup (http://docs.openstack.org/developer/devstack/) is used.

Virtual Machine

A virtual machine is an emulation of a particular computer system. Virtual machines operate based on the computer architecture and functions of a real or hypothetical computer, and their implementations may involve specialized hardware, software, or a combination of both.

Virtual Appliance

A virtual appliance is a pre-configured virtual machine image. Virtual appliances are a subset of the broader class of software appliances. A virtual appliance is not a complete virtual machine platform, but rather a software image containing a software stack
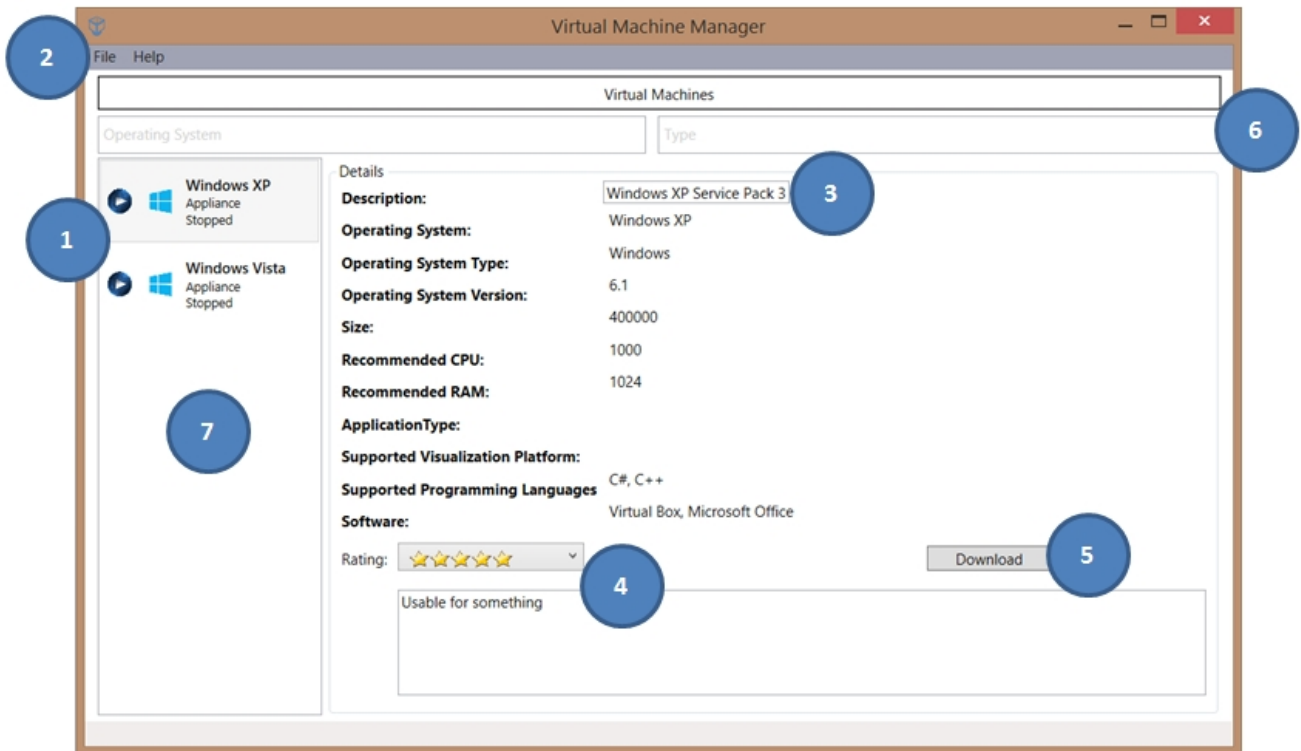
Client

The client is developed in C# and use WPF technology with the mvvm pattern. It use the REST program paradigm.
The client works with the RestSharp library which makes it easy to communicate with REST services such the marketplace service.

Overview

1. Start/ Stop virtual machine/ appliance

In this area it is possible to start and stop the available virtual machine or virtual appliance instances.

2. Upload virtual machine/ appliance

In the menu you can find an option to upload a new vm or appliance. In this project the uploaded images have to be dummy files, in our case json files with the specific description of the uploaded instance.

3. Change the description of a virtual machine/appliance

If you want to change the description of a selected instance you have to edit the text box and click the save button which then appears beside.

4. Rate and comment a virtual machine/ appliance template

To change the rating and description of a vm/ appliance, use the combo box and the text box below. After editing click the save button which will appear next to the combo box.

5. Download virtual machine/ appliance

If there is an instance selected, the user can download an image file of the selected vm/ appliance. In this project the image is a json dummy file.

6. Search for templates with specific parameters

In this project it is possible to filter the available virtual machines/ appliances by operating system name and type. For filtering you only have to fill in the filter parameters in the text boxes.

7. List virtual machine/ appliance

Once the application is started it connects to the marketplace service and requests all available virtual machines

and appliances. The results are displayed in the list box.

Message Pattern

1. Start/ Stop virtual machine/ appliance

URL: `'../machine/state/{id}/{operation}'`

Action: **POST**

Request: http://localhost:1337/machine/state/1/Start

Response:

```json
{
    "Success":true,
    "ErrorMessage":"",
    "Data":[
        {
            "Id":"1",
            "ReferencedVirtualMachineId":"",
            "Name":"Windows XP",
            "Description":"Windows 10",
            "Type":"Appliance",
            "ApplicationType":"",
            "OperatingSystem":"Windows XP",
            "OperatingSystemType":"Windows",
            "OperatingSystemVersion":"6.1",
            "Size":"400000",
            "RecommendedCPU":"1000",
            "RecommendedRAM":"1024",
            "SupportedVirtualizationPlatform":"",
            "Software":[
                "Virtual Box",
                "Microsoft Office"
            ],
            "SupportedProgramingLanguages":[
                "C#",
                "C++"
            ],
            "Rating":"1",
            "RatingDescription":"Usable for nothing",
            "Status":"Started"
        },
        {
            "Id":"2",
            "ReferencedVirtualMachineId":"",
            "Name":"Windows Vista",
            "Description":"Windows Vista",
            "Type":"Appliance",
            "ApplicationType":"",
            "OperatingSystem":"Windows Vista",
            "OperatingSystemType":"Windows",
            "OperatingSystemVersion":"5.1",
            "Size":"400000",
            "RecommendedCPU":"2000",
            "RecommendedRAM":"2048",
            "SupportedVirtualizationPlatform":"",
            "Software":[
```

```json
        "Virtual Box",
        "Microsoft Office",
        "Microsoft Visual Studio 2013"
      ],
      "SupportedProgramingLanguages":[
        "C#",
        "C++",
        "HTML"
      ],
      "Rating":"3",
      "RatingDescription":"Useable for anything",
      "Status":"Stopped"
    }
  ]
}
```

2. Upload virtual machine/ appliance

URL: `../machine`

Action: **POST**

Request: http://localhost:1337/machine

Request body:

```json
{
  "Id":"3",
  "Name":"Windows XP",
  "Description":"Windows XP Service Pack 3",
  "Type":"Virtual Machine",
  "ApplicationType":"",
  "OperatingSystem":"Windows XP",
  "OperatingSystemType":"Windows",
  "OperatingSysteVersion":"6.1",
  "Size":"400000",
  "RecommendedCPU":"1000",
  "RecommendedRAM":"1024",
  "SupportedVirtualizationPlatform":"",
  "Software":[

  ],
  "SupportedProgramingLanguages":[

  ]
}
```

Response:

```json
{
  "Success":true,
  "ErrorMessage":"",
  "Data":[
    {
      "Id":"1",
      "ReferencedVirtualMachineId":"",
      "Name":"Windows XP",
      "Description":"Windows XP Service Pack 3",
      "Type":"Appliance",
```

```json
      "ApplicationType":"",
      "OperatingSystem":"Windows XP",
      "OperatingSystemType":"Windows",
      "OperatingSystemVersion":"6.1",
      "Size":"400000",
      "RecommendedCPU":"1000",
      "RecommendedRAM":"1024",
      "SupportedVirtualizationPlatform":"",
      "Software":[
         "Virtual Box",
         "Microsoft Office"
      ],
      "SupportedProgramingLanguages":[
         "C#",
         "C++"
      ],
      "Rating":"5",
      "RatingDescription":"Usable for something",
      "Status":"Stopped"
   },
   {

      "Id":"2",
      "ReferencedVirtualMachineId":"",
      "Name":"Windows Vista",
      "Description":"Windows Vista",
      "Type":"Appliance",
      "ApplicationType":"",
      "OperatingSystem":"Windows Vista",
      "OperatingSystemType":"Windows",
      "OperatingSystemVersion":"5.1",
      "Size":"400000",
      "RecommendedCPU":"2000",
      "RecommendedRAM":"2048",
      "SupportedVirtualizationPlatform":"",
      "Software":[
         "Virtual Box",
         "Microsoft Office",
         "Microsoft Visual Studio 2013"
      ],
      "SupportedProgramingLanguages":[
         "C#",
         "C++",
         "HTML"
      ],
      "Rating":"3",
      "RatingDescription":"Useable for anything",
      "Status":"Stopped"
   },
   {

      "Id":"3",
      "Name":"Windows XP",
      "Description":"Windows XP Service Pack 3",
      "Type":"Virtual Machine",
      "ApplicationType":"",
      "OperatingSystem":"Windows XP",
      "OperatingSystemType":"Windows",
      "OperatingSysteVersion":"6.1",
      "Size":"400000",
      "RecommendedCPU":"1000",
      "RecommendedRAM":"1024",
      "SupportedVirtualizationPlatform":"",
```

```
            "Software":[

            ],
            "SupportedProgramingLanguages":[

            ],
            "Rating":"",
            "RatingDescription":"",
            "Status":"Stopped"
        }
    ]
}
```

3. Change the description of a virtual machine/appliance

URL: `'/machine/{id}/{description}'`

Action: **POST**

Request: http://localhost:1337/machine/1/Windows%10

Response:

```
{
    "Success":true,
    "ErrorMessage":"",
    "Data":[
        {
            "Id":"1",
            "ReferencedVirtualMachineId":"",
            "Name":"Windows XP",
            "Description":"Windows 10",
            "Type":"Appliance",
            "ApplicationType":"",
            "OperatingSystem":"Windows XP",
            "OperatingSystemType":"Windows",
            "OperatingSystemVersion":"6.1",
            "Size":"400000",
            "RecommendedCPU":"1000",
            "RecommendedRAM":"1024",
            "SupportedVirtualizationPlatform":"",
            "Software":[
                "Virtual Box",
                "Microsoft Office"
            ],
            "SupportedProgramingLanguages":[
                "C#",
```

```
            "C++"
        ],
        "Rating":"5",
        "RatingDescription":"Usable for something",
        "Status":"Stopped"
    },
    {
        "Id":"2",
        "ReferencedVirtualMachineId":"",
        "Name":"Windows Vista",
        "Description":"Windows Vista",
        "Type":"Appliance",
        "ApplicationType":"",
        "OperatingSystem":"Windows Vista",
        "OperatingSystemType":"Windows",
        "OperatingSystemVersion":"5.1",
        "Size":"400000",
        "RecommendedCPU":"2000",
        "RecommendedRAM":"2048",
        "SupportedVirtualizationPlatform":"",
        "Software":[
            "Virtual Box",
            "Microsoft Office",
            "Microsoft Visual Studio 2013"
        ],
        "SupportedProgramingLanguages":[
            "C#",
            "C++",
            "HTML"
        ],
        "Rating":"3",
        "RatingDescription":"Useable for anything",
        "Status":"Stopped"
    }
  ]
}
```

4. Rate and comment a virtual machine/ appliance template

URL: `'/machine/{id}/{rating}/{comment}'`

Action: **POST**

Request: http://localhost:1337/machine/1/0/Usable%20for%20nothing

Response:

```
{
    "Success":true,
    "ErrorMessage":"",
    "Data":[
        {
            "Id":"1",
            "ReferencedVirtualMachineId":"",
            "Name":"Windows XP",
            "Description":"Windows 10",
            "Type":"Appliance",
            "ApplicationType":"",
            "OperatingSystem":"Windows XP",
            "OperatingSystemType":"Windows",
            "OperatingSystemVersion":"6.1",
            "Size":"400000",
            "RecommendedCPU":"1000",
            "RecommendedRAM":"1024",
            "SupportedVirtualizationPlatform":"",
            "Software":[
                "Virtual Box",
                "Microsoft Office"
            ],
            "SupportedProgramingLanguages":[
                "C#",
                "C++"
            ],
            "Rating":"0",
            "RatingDescription":"Usable for nothing",
            "Status":"Stopped"
        },
        {
            "Id":"2",
            "ReferencedVirtualMachineId":"",
            "Name":"Windows Vista",
            "Description":"Windows Vista",
            "Type":"Appliance",
            "ApplicationType":"",
            "OperatingSystem":"Windows Vista",
            "OperatingSystemType":"Windows",
            "OperatingSystemVersion":"5.1",
            "Size":"400000",
            "RecommendedCPU":"2000",
            "RecommendedRAM":"2048",
            "SupportedVirtualizationPlatform":"",
            "Software":[
                "Virtual Box",
                "Microsoft Office",
                "Microsoft Visual Studio 2013"
            ],
            "SupportedProgramingLanguages":[
                "C#",
                "C++",
                "HTML"
            ],
            "Rating":"3",
            "RatingDescription":"Useable for anything",
            "Status":"Stopped"
```

```
        }
    ]
}
```

5. Download virtual machine/ appliance

URL: `'/download/{id}'`

Action: **GET**

Request: http://localhost:1337/download/1

Response:

```json
{
    "Id":"1",
    "ReferencedVirtualMachineId":"",
    "Name":"Windows XP",
    "Description":"Windows 10",
    "Type":"Appliance",
    "ApplicationType":"",
    "OperatingSystem":"Windows XP",
    "OperatingSystemType":"Windows",
    "OperatingSystemVersion":"6.1",
    "Size":"400000",
    "RecommendedCPU":"1000",
    "RecommendedRAM":"1024",
    "SupportedVirtualizationPlatform":"",
    "Software":[
        "Virtual Box",
        "Microsoft Office"
    ],
    "SupportedProgramingLanguages":[
        "C#",
        "C++"
    ],
    "Rating":"0",
    "RatingDescription":"Usable for nothing",
    "Status":"Stopped"
}
```

6. Search for templates with specific parameters

URL: `'/machine/{operatingsystem}/{type}'`

Action: **GET**

Request: http://localhost:1337/machine/all/Virt

Response:

```json
{
    "Success":true,
    "ErrorMessage":"",
    "Data":[
```

```
{
    "Id":"3",
    "Name":"Windows XP",
    "Description":"Windows XP Service Pack 3",
    "Type":"Virtual Machine",
    "ApplicationType":"",
    "OperatingSystem":"Windows XP",
    "OperatingSystemType":"Windows",
    "OperatingSysteVersion":"6.1",
    "Size":"400000",
    "RecommendedCPU":"1000",
    "RecommendedRAM":"1024",
    "SupportedVirtualizationPlatform":"",
    "Software":[

    ],
    "SupportedProgramingLanguages":[

    ],
    "Rating":"",
    "RatingDescription":"",
    "Status":"Stopped"
    }
  ]
}
```

7. List virtual machine/ appliance

URL: `/machines`

Action: **GET**

Request: http://localhost:1337/machines

Response:

```
{
    "Success":true,
    "ErrorMessage":"",
    "Data":[
        {
            "Id":"1",
            "ReferencedVirtualMachineId":"",
            "Name":"Windows XP",
            "Description":"Windows XP Service Pack 3",
            "Type":"Appliance",
            "ApplicationType":"",
            "OperatingSystem":"Windows XP",
            "OperatingSystemType":"Windows",
            "OperatingSystemVersion":"6.1",
            "Size":"400000",
            "RecommendedCPU":"1000",
            "RecommendedRAM":"1024",
            "SupportedVirtualizationPlatform":"",
            "Software":[
                "Virtual Box",
                "Microsoft Office"
            ],
            "SupportedProgramingLanguages":[
```

```json
            "C#",
            "C++"
        ],
        "Rating":"5",
        "RatingDescription":"Usable for something",
        "Status":"Stopped"
    },
    {
        "Id":"2",
        "ReferencedVirtualMachineId":"",
        "Name":"Windows Vista",
        "Description":"Windows Vista",
        "Type":"Appliance",
        "ApplicationType":"",
        "OperatingSystem":"Windows Vista",
        "OperatingSystemType":"Windows",
        "OperatingSystemVersion":"5.1",
        "Size":"400000",
        "RecommendedCPU":"2000",
        "RecommendedRAM":"2048",
        "SupportedVirtualizationPlatform":"",
        "Software":[
            "Virtual Box",
            "Microsoft Office",
            "Microsoft Visual Studio 2013"
        ],
        "SupportedProgramingLanguages":[
            "C#",
            "C++",
            "HTML"
        ],
        "Rating":"3",
        "RatingDescription":"Useable for anything",
        "Status":"Stopped"
    }
  ]
}
```

REST vs. SOAP

The following chapter explain our design decisions, and why we decided to use REST instead of SOAP.

Design Decision

Due to the fact that REST is easier to set up than SOAP we decided to use the REST program paradigm. Since REST uses standard HTTP it is much simpler, furthermore one important fact is that SOAP only works with XML and doesn't provide any other possibilities. We preferred to use JSON as data format because it is more readable than XML and produce not so much overhead.

Server

This chapter will give you some information about the server machine with Openstack. For example which OS we used and which version of Openstack.

Overview

For the latest Ubuntu Desktop image, visit Download page.
The Desktop image will be sufficient for testing. The GUI will be easier to use for none command line users.

The standard Openstack installation consists of different nodes. These nodes are extra machines. For testing Openstack on a single machine, devstack implementation is used.
All nodes will be simulated on a single VM or single machine. You can download devstack from the Github repository.

In this example the single machine installation is used, to avoid nested VMs.

For the latest Ubuntu Desktop image, visit Download page.
The Desktop image will be sufficient for testing. The GUI will be easier to use for none command line users.