



Single Page Application with Perl Dancer

by Gábor Szabó

Single Page Application with Perl Dancer

Gábor Szabó

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Preface

Perl might not get much press these days, but 30 years after its first release it still has a significant developer community. There are countless organizations where Perl is used for mission critical applications. Every year there is a new release of Perl and CPAN is alive and kicking.

Unlike in 90's, these days there are many languages that can be used to do similar tasks to Perl. Each language with its own strength and weaknesses. One area that grew significantly is the writing of modern web-applications. Two significant new directions are Single Page Applications and Microservices. Interestingly they have a common attribute: They both need to have a well designed API over HTTP.

There are a number of modern frameworks that provide the foundation for that kind of work. Perl Dancer is one of them.

My hope is that by reading this book you will learn the basics of how to write modern Single Page Applications and Microservices. I cannot dream to provide an in-depth book about all the parts that are needed for either an SPA or a Microservice based architecture, but I'll do my best. If you follow along, by the end of the book you will be able to write your own SPA and create a Microservice using Perl Dancer. You will also know how to test these applications and how to deploy them.

This eBook is still in writing. Things will change. Your input is invaluable!

While in most of the book, including in the title, I use the name “Dancer”, if I would like to be really exact, I should write Dancer2. Dancer2 is a rewrite of Dancer which is almost but not quite backward compatible. The main difference between the two is that Dancer2 is expected to be the future. If you are interested in the differences between the two, check out the [article written by Sawyer](http://advent.perldancer.org/2014/2)¹.

¹<http://advent.perldancer.org/2014/2>

Status

I've started to write this eBook in September 2017. It seems work is done in a very irregular way. Sometimes I have a few days or a week in a row that I manage to work on the book and then a few week or even month of other tasks.

In other words, it is making progress, but it is slower than I expected.

See the [changes](#) section if you'd like to know more about the progress.

OK, but when will the book be finished?

Between you and me?

I don't know.

When is a piece of software finished?

It is a never ending story. We can always fix some bugs and add some features. Especially that the world around us changes. So do the requirements.

If I was using a traditional publishing house and if I was planning to create a printed version of the book I might really need to stop working on it at one point. But give that I am using Leanpub, I can keep tweaking it and adding new content to it for an infinite time. Give or take a few years. You will always have access to the most recent edition of the eBook.

So here is what I suggest:

Start reading the book and** start writing your Dancer-based web application. If you get stuck and the book does not give you an answer how to continue, get in touch with me the same way as you'd [report a bug](#) in the book. I'll do my best to give you some help.

Outline

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Installations and Setup

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SPA Echo

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jQuery

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Submitting a form in a SPA

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Client side input validation and error handling

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Server Side input validation

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Server Side Errors

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Authentication and Authorization

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SEO - Search Engine Optimization

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Pages: client side routing

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Main Route

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Testing the back-end API

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Solutions

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Appendix

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Support

If you need support with Dancer you can get it in a number of channels.

There is a mailing list called dancer-users. You can find link to it on the [about](#)² page of the Perl Dancer web site. This is probably the best place if you have a question about Dancer. I am also lurking on this list so if something is unclear in the content of the book then feel free to ask there.

You can use IRC to chat with other Dancer developers. Connect to the #dancer channel on the irc.perl.org IRC server. You might use your own IRC client on your computer, or try this web based client: [Mibbit for Dancer](#)³.

[Perl Monks](#)⁴ is the place to ask general Perl related questions.

Stack Overflow can be a good place to ask questions. Tag them with both [perl](#) and [dancer](#)⁵.

In order to get help with jQuery you can also use the [Stack Overflow with jquery](#)⁶ tag.

²<http://perldancer.org/about>

³<http://perldancer.org/irc>

⁴<http://www.perlmonks.org/>

⁵<https://stackoverflow.com/questions/tagged/dancer>

⁶<https://stackoverflow.com/questions/tagged/jquery>

Exercises

Reading a book is nice, but if you'd really like to learn how to build something you need to get your hands dirty. So as soon as possible you need to start implementing whatever you learned. The best might be to start building a project yourself. In any case I'll provide a few exercises that will make use of the things you might have already encountered in the book. If you need help you can always check out the various [support channels](#).

- [Hello World](#)
- [Calculator](#)

Bug reporting

If you encounter problems with the book, first please verify you are reading the most recent version of the book. Check the first page of the book you have for “This version was published on DATE” and compare it to the same line of the [Sample chapter](#)⁷ on the Leanpub web site.

If this is the latest version, then report the problem by sending an e-mail to me: Gabor Szabo gabor@szabgab.com with the following information:

1. The publish date of the book you are reading. You can find “This version was published on DATE” on the first internal page of the book.
2. What operating system do you use? (If Linux then which distribution, which version etc.?)
3. What did you do (list the commands and their output)?
4. What did you expected that did not happen?

If you encounter problems with Dancer2 itself, please visit the [GitHub repository of the Dancer2 project](#)⁸. There you’ll find the “Issues”. Check if the issue has been already reported. If it has, you are welcome to comment on the issue adding your report. If not, then please open a new issue. Here too, it would be useful to give the information listed above. You can leave the publishing date of the book out, as that is probably not relevant.

⁷<https://leanpub.com/dancer-spa>

⁸<https://github.com/PerlDancer/Dancer2>

Changes

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Supporters

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Thank you for your trust and support!

The Perl Shop, LLC,

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Akshay Mohit, Cyril Grall,

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Biker, Zak Zebrowski,

Daniel Maldonado, Ralph Schuler,

Jiří Pavlovský,

and a few more people who wished to stay Anonymous.

If you have supported the campaign, but your name does not appear here it might be that you marked your support as “Private” or that I made a mistake. In either case contact me by e-mail so I can correct the issue.

Contributors

People who have contributed to the book from the initial idea, through the crowdfunding campaign, till...

wait, the book is not ready yet. You still have a chance to get listed.

Send me comments, suggestions, and fixes!

A. Sinan Unur,
Andrew Solomon,
Chris Davies,
Dave Cross,
Jason A. Crome,
Kaare Rasmussen,
Leo Lapworth,
Olaf Alders,
R Geoffrey Avery,
Sawyer X,
Sören Laird Sörries,
Theo van Hoesel,
Tudor Constantin,
Yanick Champoux,
Warren Young,

especially Olaf helped a lot with the text of the crowdfunding campaign.

If I left your name out, let me apologize and let me ask you to remind me so I can make it right.

History of Dancer

The Perl Dancer project was created by Alexis Sukrieh in 2009 as a Perl clone of the Sinatra web framework written in Ruby.

The main advantage of these route-based frameworks was and still is simplicity in getting up and running.

After several years in use the core developers of Dancer arrived to the conclusion that in order to make progress they will need to make substantial changes to the framework. Some of those are not going to be backward compatible. Because the way CPAN and the cpan clients work it is difficult to distribute two different production versions of a module, the developers decided to use the name Dancer2 for the rewrite.

The first commit of Dancer was created by Alexis Sukrieh on Fri Jul 17 19:02:39 2009 +0200.

The first commit of Dancer2 was created by Alexis Sukrieh on Sun Aug 14 21:07:33 2011 +0200.

Part 1

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Setup development environment

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Development environment using Docker

[Docker](https://www.docker.com/)⁹ is the de-facto standard for containerization. Instead of installing many applications on the same server, and instead of setting up separate linux boxes for each applications, Docker allows the use of the same Linux box with a good separation of applications.

Docker also makes it very easy to set up standardized development, testing and production environments for each application and regardless of the desktop Operating system used by the developers.

Docker is also light-weight. Much lighter than setting up a Linux box using [Vagrant](https://www.vagrantup.com/).

In Docker an “image” is a disk and a configuration of a partial Linux box. When you run an image Docker creates a container and the container is the thing that actually runs. When the container has finished running you can usually delete it and run the image again creating another containers.

While you can change the content of a container, people usually consider them as read-only assuming that anything written to it (e.g. temp files) will be gone soon.

Start with Docker

[Install Docker](https://www.docker.com/)¹⁰ and make sure the Docker daemon is running. Run the following command:

```
1 docker run --rm hello-world
```

It will print something like this:

⁹<https://www.docker.com/>

¹⁰<https://www.docker.com/>

```
1  Unable to find image 'hello-world:latest' locally
2  latest: Pulling from library/hello-world
3  9bb5a5d4561a: Pull complete
4  Digest: sha256:3e1764d0f546ceac4565547df2ac4907fe46f007ea229fd7ef2718514bcec35d
5  Status: Downloaded newer image for hello-world:latest
6
7  Hello from Docker!
8  This message shows that your installation appears to be working correctly.
9
10 To generate this message, Docker took the following steps:
11  1. The Docker client contacted the Docker daemon.
12  2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
13     (amd64)
14  3. The Docker daemon created a new container from that image which runs the
15     executable that produces the output you are currently reading.
16  4. The Docker daemon streamed that output to the Docker client, which sent it
17     to your terminal.
18
19 To try something more ambitious, you can run an Ubuntu container with:
20 $ docker run -it ubuntu bash
21
22 Share images, automate workflows, and more with a free Docker ID:
23 https://hub.docker.com/
24
25 For more examples and ideas, visit:
26 https://docs.docker.com/engine/userguide/
```

The first line tells you that it could not find the hello-world Docker image on your computer. The second line tells you that it is downloading the image.

Once the image was downloaded, Docker runs it. The only thing this Docker image does is printing some text to the screen. That's what you can see. (The `<hl>-rm</hl>` option told Docker to remove the Docker container after it has finished running.)

This little exercise proved that Docker works properly on your computer.

You can now list all the images on your computer using

```
1 docker images
```

and you can remove the "hello-world" image using:

```
1 docker rmi hello-world
```

Docker images

There are plenty of Docker images in the [Docker Hub](https://hub.docker.com/)¹¹ we can start using. I have created one of my own. I am going to explain how to build your own Docker image later on. For now, let's see how to reuse the one I've already created.

Run the following command:

```
1 docker run --rm -it szabgab/ubuntu-perl-dancer2
```

At first it will complain that the image `szabgab/ubuntu-perl-dancer2` cannot be found locally and then it will download it. This will take some time and it will take up some space on your disk, but subsequent runs using the same image will be much faster. At the end of this operation you'll see a prompt like this:

```
1 root@1419cda365b8:~#
```

This happens because we supplied the `-it` flags. This means you are now inside the container on the command line. You can now run commands like

```
1 perl -v
```

to see which version of Perl is available (5.26.1) or

```
1 perl -MDancer2 -E'say $Dancer2::VERSION'
```

to see which version of `Dancer2` is available (0.205002).

Once you are done, you can exit by typing `exit`.

This will get you back to the prompt of your operating system. It will also remove the Docker container you used because we supplied the `--rm` flag. That means if you made any changes (installed more software using `apt-get` or `cpanm`, all those changes will be gone. (If you want to make them persistent, you'll have to create your own Docker image.)

Running Hello World with Docker

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¹¹<https://hub.docker.com/>

Running Hello Dancer with Docker

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TBD Building Docker image

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Development environment using Vagrant

VirtualBox allows you to install a new operating system inside your existing operating system without making any changes to your existing operating system. From the point of view of your current operating system it will be seen just as a directory with a few files in it you can delete any time. This allows you to have a full-blown Linux on top of your Windows machine. Then you can use that Linux machine without creating a mess for others in the family who might be using the same machine.

Vagrant is a command line tool that makes it easy to manage VirtualBox instances.

- Download and install the latest version of [VirtualBox](https://www.virtualbox.org/)¹².
- Download and install the latest version of [Vagrant](https://www.vagrantup.com/)¹³.
- Create a directory where you'll have your Vagrant configuration file.
- Open the Terminal or Command Prompt and change directory to the one you've just created.
- Type: `vagrant init ubuntu/zesty64`

This means we base our virtual environment on the Zesty64 release of [Ubuntu](https://wiki.ubuntu.com/Releases)¹⁴. According to the [releases list](https://wiki.ubuntu.com/Releases)¹⁵ Zesty is Ubuntu 17.04 released in April 2017.

By the time you are reading this book Ubuntu might have released newer versions of it Operating System. Feel free to use the most recent version. Most likely the rest of the book and all the examples will work there too.

The output of the `vagrant init` command will look like this:

¹²<https://www.virtualbox.org/>

¹³<https://www.vagrantup.com/>

¹⁴<https://www.ubuntu.com/>

¹⁵<https://wiki.ubuntu.com/Releases>

```

1 A `Vagrantfile` has been placed in this directory. You are now
2 ready to `vagrant up` your first virtual environment! Please read
3 the comments in the Vagrantfile as well as documentation on
4 `vagrantup.com` for more information on using Vagrant.

```

It will create a file called Vagrantfile in the current directory.

We need to make some adjustment to this file. Edit the Vagrantfile with your favorite text editor and add two lines that will map the ports of the guest operating system. The guest operating system being the one we are going to install now and the host operating system that runs on your computer.

```

1 config.vm.network "forwarded_port", guest: 5000, host:5000
2 config.vm.network "forwarded_port", guest: 3000, host:3000

```

By default Vagrant allocates 1Gb memory to the guest operating system. In most cases this is enough, but if not, you can increase the allocated memory by changing the `vb.memory` line.

Change the line `vb.memory` to `vb.memory = "2048"`.

This is the Vagrant file I have:

code/Vagrantfile

```

1 # -*- mode: ruby -*-
2 # vi: set ft=ruby :
3
4 # All Vagrant configuration is done below. The "2" in Vagrant.configure
5 # configures the configuration version (we support older styles for
6 # backwards compatibility). Please don't change it unless you know what
7 # you're doing.
8 Vagrant.configure("2") do |config|
9   # The most common configuration options are documented and commented below.
10   # For a complete reference, please see the online documentation at
11   # https://docs.vagrantup.com.
12
13   # Every Vagrant development environment requires a box. You can search for
14   # boxes at https://atlas.hashicorp.com/search.
15   config.vm.box = "ubuntu/zesty64"
16
17   # Disable automatic box update checking. If you disable this, then
18   # boxes will only be checked for updates when the user runs
19   # `vagrant box outdated`. This is not recommended.
20   # config.vm.box_check_update = false
21
22   # Create a forwarded port mapping which allows access to a specific port

```

```
23  # within the machine from a port on the host machine. In the example below,
24  # accessing "localhost:8080" will access port 80 on the guest machine.
25  # NOTE: This will enable public access to the opened port
26  # config.vm.network "forwarded_port", guest: 80, host: 8080
27  config.vm.network "forwarded_port", guest: 5000, host:5000
28  config.vm.network "forwarded_port", guest: 3000, host:3000
29
30  # Create a forwarded port mapping which allows access to a specific port
31  # within the machine from a port on the host machine and only allow access
32  # via 127.0.0.1 to disable public access
33  # config.vm.network "forwarded_port", guest: 80, host: 8080, host_ip: "127.0.0.1"
34
35  # Create a private network, which allows host-only access to the machine
36  # using a specific IP.
37  # config.vm.network "private_network", ip: "192.168.33.10"
38
39  # Create a public network, which generally matched to bridged network.
40  # Bridged networks make the machine appear as another physical device on
41  # your network.
42  # config.vm.network "public_network"
43
44  # Share an additional folder to the guest VM. The first argument is
45  # the path on the host to the actual folder. The second argument is
46  # the path on the guest to mount the folder. And the optional third
47  # argument is a set of non-required options.
48  # config.vm.synced_folder "../data", "/vagrant_data"
49  config.vm.synced_folder "../App-SlideShow", "/App-SlideShow"
50  config.vm.synced_folder "../App-Demo", "/App-Demo"
51
52  # Provider-specific configuration so you can fine-tune various
53  # backing providers for Vagrant. These expose provider-specific options.
54  # Example for VirtualBox:
55  #
56  # config.vm.provider "virtualbox" do |vb|
57  #   # Display the VirtualBox GUI when booting the machine
58  #   vb.gui = true
59  #
60  #   # Customize the amount of memory on the VM:
61  #   vb.memory = "1024"
62  # end
63  #
64  # View the documentation for the provider you are using for more
65  # information on available options.
```

```

66
67 # Define a Vagrant Push strategy for pushing to Atlas. Other push strategies
68 # such as FTP and Heroku are also available. See the documentation at
69 # https://docs.vagrantup.com/v2/push/atlas.html for more information.
70 # config.push.define "atlas" do |push|
71 #   push.app = "YOUR_ATLAS_USERNAME/YOUR_APPLICATION_NAME"
72 # end
73
74 # Enable provisioning with a shell script. Additional provisioners such as
75 # Puppet, Chef, Ansible, Salt, and Docker are also available. Please see the
76 # documentation for more information about their specific syntax and use.
77 # config.vm.provision "shell", inline: <<-SHELL
78 #   apt-get update
79 #   apt-get install -y apache2
80 # SHELL
81 end

```

- Then you can type in `vagrant up`.

This will start the Virtual Machine. The first time you run this, the command will need to download the image and thus it might take some time. Once it is done you get back the prompt of your host operating system.

- Then you can type the command that will take you into the guest operating system where you'll see a prompt like this:

```
1 ubuntu@ubuntu-zesty:~$
```

Linux, Mac OSX

The command to ssh into the guest operating system:

```
vagrant ssh
```

MS Windows

On MS Windows you can use [Putty](https://www.chiark.greenend.org.uk/~sgtatham/putty/download.html)¹⁶ to connect to the Vagrant based VirtualBox image.

You will need to download both `putty.exe` and `puttygen.exe`. You can then follow [these instructions](https://www.sitepoint.com/getting-started-vagrant-windows/)¹⁷.

Once you installed the private key, Putty will let you connect to the virtualbox. It will still prompt for a username though, where you need to type in 'vagrant'.

¹⁶<https://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>

¹⁷<https://www.sitepoint.com/getting-started-vagrant-windows/>

Installing Linux environment

At this point you need to follow the instructions on how to set up the development environment on Linux. Once you are done with that you can do all the rest of the tasks using this Virtual Box.

When you stop working on the project, you can leave the guest operating system by typing `exit` that will take you back to the command prompt of the host operating system. You can now shut down the VirtualBox image by typing: `vagrant halt`.

The next time you'd like to use the VirtualBox image you need to `cd` to the same directory and type `vagrant up`. This time it should be much faster as you already have the image locally. Then you can type `vagrant ssh` and it will move you into the guest operating system.

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