Spring Boot File upload example with Multipart File

bezkoder.com/spring-boot-file-upload

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In this tutorial, I will show you how to upload and download files with a Spring Boot Rest APIs to/from a static folder. We also use Spring Web `MultipartFile` interface to handle HTTP multi-part requests.

This Spring Boot App works with:
– Angular 8 Client / Angular 10 Client / Angular 11 Client / Angular 12
– Angular Material 12
– Vue Client / Vuetify Client
– React Client / React Hooks Client
– Material UI Client
– React Image Upload with Preview

Related Posts:
– How to upload multiple files in Java Spring Boot
– Spring Boot: Upload/Import Excel file data into MySQL Database
– Spring Boot: Upload/Import CSV file data into MySQL Database

Deployment: Deploy Spring Boot App on AWS – Elastic Beanstalk

Spring Boot Rest APIs for uploading Files

Our Spring Boot Application will provide APIs for:

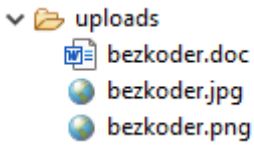
- uploading File to a static folder in the Server
- downloading File from server with the link
- getting list of Files' information (file name & url)

These are APIs to be exported:

Methods	Urls	Actions
POST	/upload	upload a File
GET	/files	get List of Files (name & url)
GET	/files/[filename]	download a File

This is the static folder that stores all uploaded files:

If you want to store files in database like this:



id	data	name	type
5d71322e-a954-4d7a-b0e6-7c799b5aae5f	BLOB	bezkoder.png	image/png
6ba3578c-ce22-4dd7-999e-72192bf31b53	BLOB	bezkoder.doc	application/msword
88108ee4-5354-4041-bfc6-2965fc8af4f4	BLOB	bezkoder.jpg	image/jpeg

You can find instruction at:
Spring Boot Upload/Download File to/from Database example

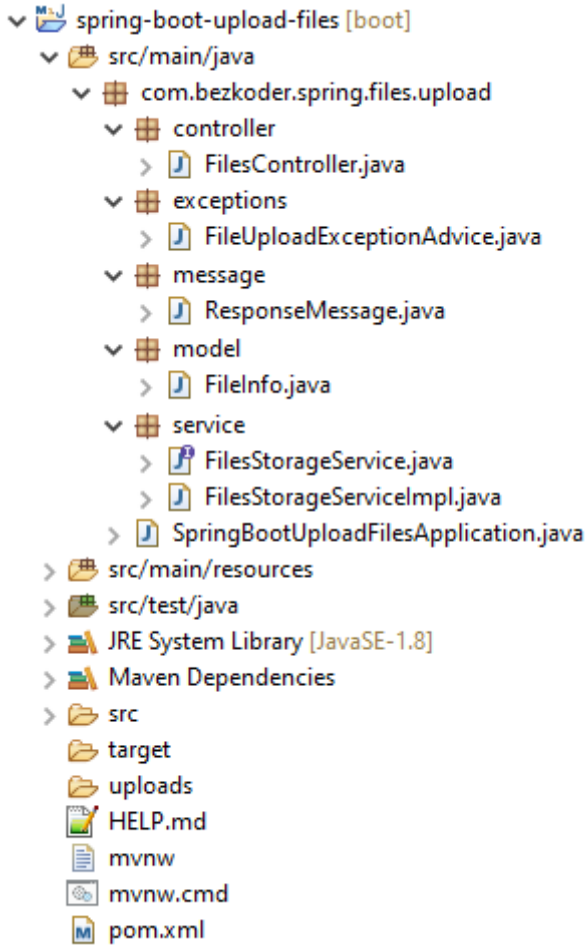
Technology

- Java 8
- Spring Boot 2 (with Spring Web MVC)
- Maven 3.6.1

Project Structure

Let me explain it briefly.

– `FileInfo` contains information of the uploaded file.
– `FilesStorageService` helps us to initialize storage, save new file, load file, get list of Files' info, delete all files.
– `FilesController` uses `FilesStorageService` to export Rest APIs: POST a file, GET all files' information, download a File.
– `FileUploadExceptionAdvice` handles exception when the controller processes file upload.
– *application.properties* contains configuration for Servlet Multipart.
– *uploads* is the static folder for storing files.
– *pom.xml* for Spring Boot dependency.



Setup Spring Boot project

Use Spring web tool or your development tool (Spring Tool Suite, Eclipse, Intellij) to create a Spring Boot project.

Then open **pom.xml** and add these dependencies:

```
<dependency>
  <groupId>org.springframework.boot</groupId>
  <artifactId>spring-boot-starter-web</artifactId>
</dependency>
```

Create Service for File Storage

First we need an interface that will be autowired in the Controller.
In *service* folder, create `FilesStorageService` interface like following code:

service/FilesStorageService.java

```
package com.bezkoder.spring.files.upload.service;
import java.nio.file.Path;
import java.util.stream.Stream;
import org.springframework.core.io.Resource;
import org.springframework.web.multipart.MultipartFile;
public interface FilesStorageService {
  public void init();
  public void save(MultipartFile file);
  public Resource load(String filename);
  public void deleteAll();
  public Stream<Path> loadAll();
}
```

Now we create implementation of the interface.

service/FilesStorageServiceImpl.java

```
package com.bezkoder.spring.files.upload.service;
import java.io.IOException;
import java.net.MalformedURLException;
import java.nio.file.Files;
import java.nio.file.Path;
import java.nio.file.Paths;
import java.util.stream.Stream;
import org.springframework.core.io.Resource;
import org.springframework.core.io.UrlResource;
import org.springframework.stereotype.Service;
import org.springframework.util.FileSystemUtils;
import org.springframework.web.multipart.MultipartFile;
@Service
public class FilesStorageServiceImpl implements FilesStorageService {
  private final Path root = Paths.get("uploads");
  @Override
  public void init() {
    try {
      Files.createDirectory(root);
    } catch (IOException e) {
      throw new RuntimeException("Could not initialize folder for upload!");
    }
  }
  @Override
  public void save(MultipartFile file) {
    try {
      Files.copy(file.getInputStream(),
this.root.resolve(file.getOriginalFilename()));
    } catch (Exception e) {
      throw new RuntimeException("Could not store the file. Error: " +
e.getMessage());
    }
  }
  @Override
  public Resource load(String filename) {
    try {
      Path file = root.resolve(filename);
      Resource resource = new UrlResource(file.toUri());
      if (resource.exists() || resource.isReadable()) {
        return resource;
      } else {
        throw new RuntimeException("Could not read the file!");
      }
    } catch (MalformedURLException e) {
      throw new RuntimeException("Error: " + e.getMessage());
    }
  }
  @Override
  public void deleteAll() {
    FileSystemUtils.deleteRecursively(root.toFile());
  }
  @Override
  public Stream<Path> loadAll() {
    try {
      return Files.walk(this.root, 1).filter(path ->
!path.equals(this.root)).map(this.root::relativize);
    } catch (IOException e) {
      throw new RuntimeException("Could not load the files!");
    }
```

```
  }
}
```

Define Data Models

Let's create `FileInfo` model which has fields: `name` & `url`.

model/FileInfo.java

```
package com.bezkoder.spring.files.upload.model;
public class FileInfo {
  private String name;
  private String url;
  public FileInfo(String name, String url) {
    this.name = name;
    this.url = url;
  }
  public String getName() {
    return this.name;
  }
  public void setName(String name) {
    this.name = name;
  }
  public String getUrl() {
    return this.url;
  }
  public void setUrl(String url) {
    this.url = url;
  }
}
```

Define Response Message

The `ResponseMessage` is for message to client that we're gonna use in Rest Controller and Exception Handler.

message/ResponseMessage.java

```
package com.bezkoder.spring.files.upload.message;
public class ResponseMessage {
  private String message;
  public ResponseMessage(String message) {
    this.message = message;
  }
  public String getMessage() {
    return message;
  }
  public void setMessage(String message) {
    this.message = message;
  }
}
```

Create Controller for upload & download Files

In **controller** package, we create `FilesController`.

controller/FilesController.java

```
package com.bezkoder.spring.files.upload.controller;
import java.util.List;
import java.util.stream.Collectors;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.core.io.Resource;
import org.springframework.http.HttpHeaders;
import org.springframework.http.HttpStatus;
import org.springframework.http.ResponseEntity;
import org.springframework.stereotype.Controller;
import org.springframework.web.bind.annotation.CrossOrigin;
import org.springframework.web.bind.annotation.GetMapping;
import org.springframework.web.bind.annotation.PathVariable;
import org.springframework.web.bind.annotation.PostMapping;
import org.springframework.web.bind.annotation.RequestParam;
import org.springframework.web.bind.annotation.ResponseBody;
import org.springframework.web.multipart.MultipartFile;
import
org.springframework.web.servlet.mvc.method.annotation.MvcUriComponentsBuilder;
import com.bezkoder.spring.files.upload.model.FileInfo;
import com.bezkoder.spring.files.upload.model.ResponseMessage;
import com.bezkoder.spring.files.upload.service.FilesStorageService;
@Controller
@CrossOrigin("http://localhost:8081")
public class FilesController {
  @Autowired
  FilesStorageService storageService;
  @PostMapping("/upload")
  public ResponseEntity<ResponseMessage> uploadFile(@RequestParam("file")
MultipartFile file) {
    String message = "";
    try {
      storageService.save(file);
      message = "Uploaded the file successfully: " + file.getOriginalFilename();
      return ResponseEntity.status(HttpStatus.OK).body(new
ResponseMessage(message));
    } catch (Exception e) {
      message = "Could not upload the file: " + file.getOriginalFilename() + "!";
      return ResponseEntity.status(HttpStatus.EXPECTATION_FAILED).body(new
ResponseMessage(message));
    }
  }
  @GetMapping("/files")
  public ResponseEntity<List<FileInfo>> getListFiles() {
    List<FileInfo> fileInfos = storageService.loadAll().map(path -> {
      String filename = path.getFileName().toString();
      String url = MvcUriComponentsBuilder
          .fromMethodName(FilesController.class, "getFile",
path.getFileName().toString()).build().toString();
      return new FileInfo(filename, url);
    }).collect(Collectors.toList());
    return ResponseEntity.status(HttpStatus.OK).body(fileInfos);
  }
  @GetMapping("/files/{filename:.+}")
  @ResponseBody
  public ResponseEntity<Resource> getFile(@PathVariable String filename) {
    Resource file = storageService.load(filename);
    return ResponseEntity.ok()
        .header(HttpHeaders.CONTENT_DISPOSITION, "attachment; filename=\"" +
file.getFilename() + "\"").body(file);
```

```
  }
}
```

– `@CrossOrigin` is for configuring allowed origins.
– `@Controller` annotation is used to define a controller.
– `@GetMapping` and `@PostMapping` annotation is for mapping HTTP GET & POST requests onto specific handler methods:

- POST /upload: `uploadFile()`
- GET /files: `getListFiles()`
- GET /files/[filename]: `getFile()`

– We use `@Autowired` to inject implementation of `FilesStorageService` bean to local variable.

Configure Multipart File for Servlet

Let's define the maximum file size that can be uploaded in *application.properties* as following:

```
spring.servlet.multipart.max-file-size=500KB
spring.servlet.multipart.max-request-size=500KB
```

– `spring.servlet.multipart.max-file-size` : max file size for each request.
– `spring.servlet.multipart.max-request-size` : max request size for a multipart/form-data.

Handle File Upload Exception

This is where we handle the case in that a request exceeds Max Upload Size. The system will throw `MaxUploadSizeExceededException` and we're gonna use `@ControllerAdvice` with `@ExceptionHandler` annotation for handling the exceptions.

exception/FileUploadExceptionAdvice.java

```
package com.bezkoder.spring.files.upload.exception;
import org.springframework.web.multipart.MaxUploadSizeExceededException;
import
org.springframework.web.servlet.mvc.method.annotation.ResponseEntityExceptionHandle

import com.bezkoder.spring.files.upload.model.ResponseMessage;
import org.springframework.http.HttpStatus;
import org.springframework.http.ResponseEntity;
import org.springframework.web.bind.annotation.ControllerAdvice;
import org.springframework.web.bind.annotation.ExceptionHandler;
@ControllerAdvice
public class FileUploadExceptionAdvice extends ResponseEntityExceptionHandler {
  @ExceptionHandler(MaxUploadSizeExceededException.class)
  public ResponseEntity<ResponseMessage>
handleMaxSizeException(MaxUploadSizeExceededException exc) {
    return ResponseEntity.status(HttpStatus.EXPECTATION_FAILED).body(new
ResponseMessage("File too large!"));
  }
}
```

Initialize Storage

We need to run `init()` method of `FilesStorageService` (and also `deleteAll()` if necessary). So open *SpringBootUploadFilesApplication.java* and implement `CommandLineRunner` for `run()` method like this:

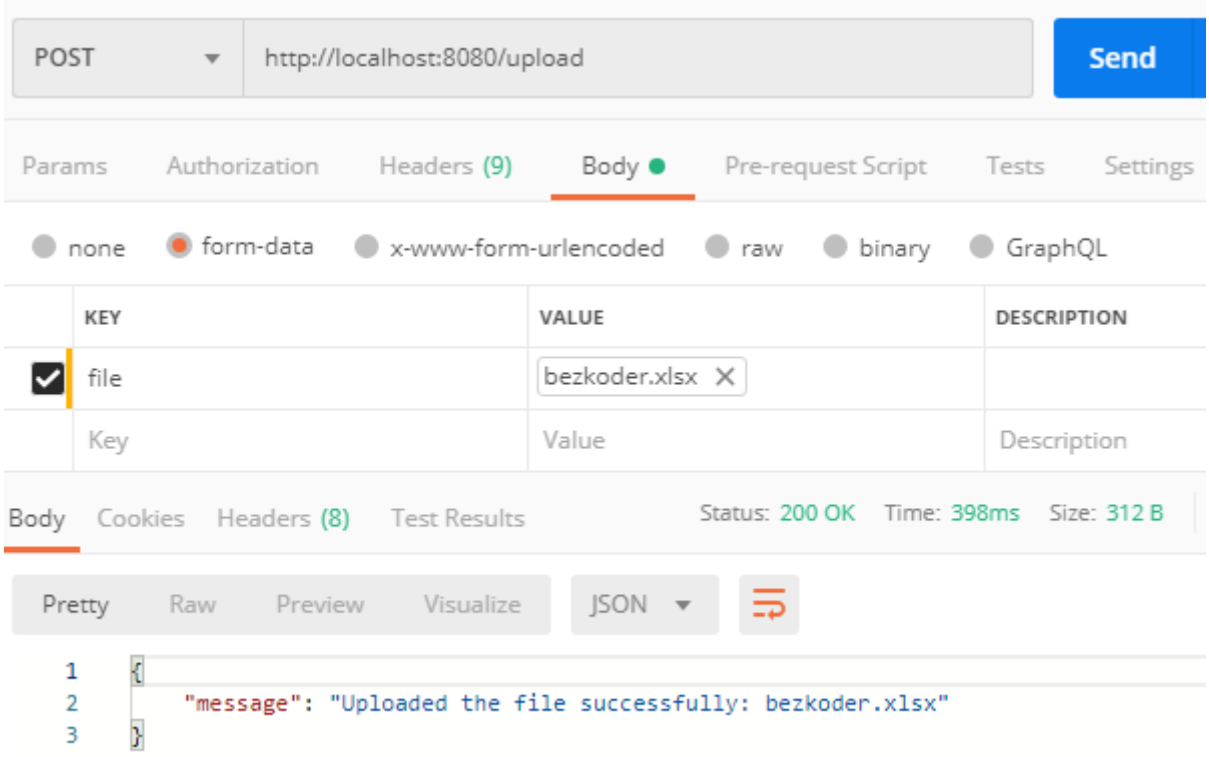
```
package com.bezkoder.spring.files.upload;
import javax.annotation.Resource;
import org.springframework.boot.CommandLineRunner;
import org.springframework.boot.SpringApplication;
import org.springframework.boot.autoconfigure.SpringBootApplication;
import com.bezkoder.spring.files.upload.service.FilesStorageService;
@SpringBootApplication
public class SpringBootUploadFilesApplication implements CommandLineRunner {
  @Resource
  FilesStorageService storageService;
  public static void main(String[] args) {
    SpringApplication.run(SpringBootUploadFilesApplication.class, args);
  }
  @Override
  public void run(String... arg) throws Exception {
    storageService.deleteAll();
    storageService.init();
  }
}
```

Run & Test

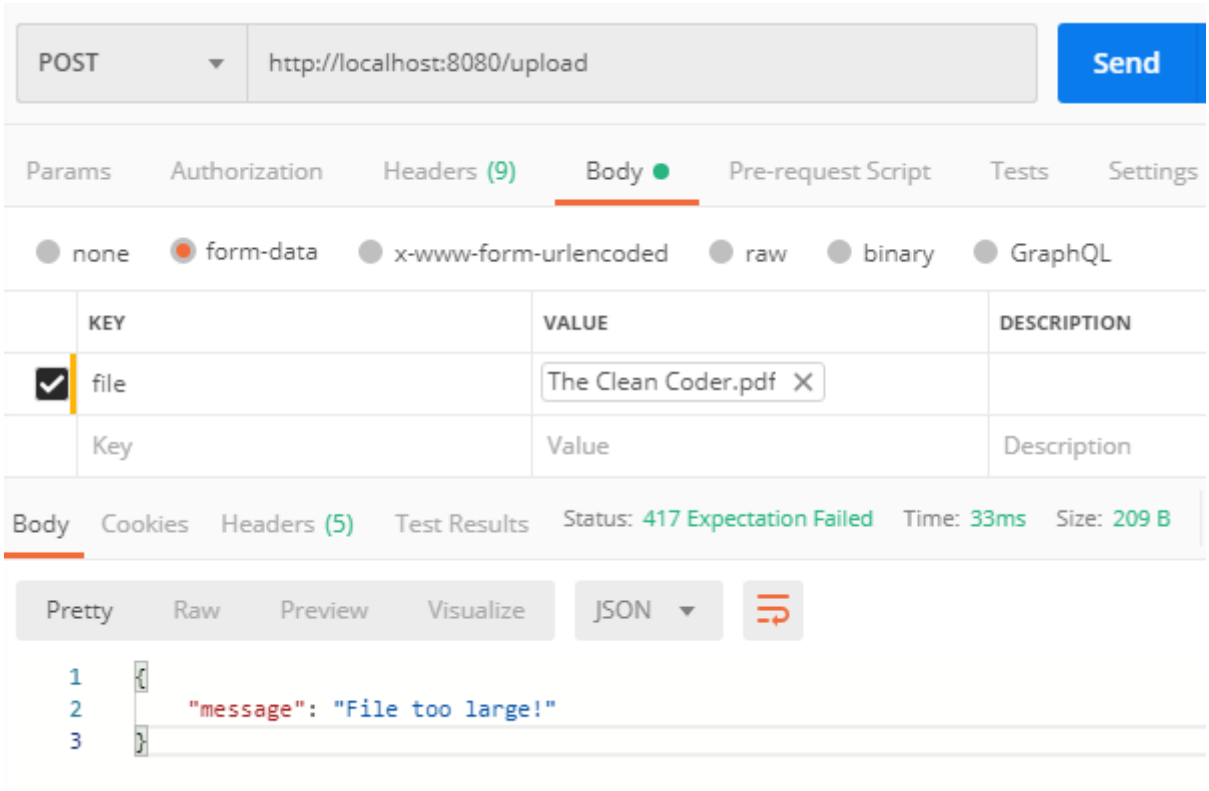
Run Spring Boot application with command: `mvn spring-boot:run`.
Refresh the project directory and you will see *uploads* folder inside it.

Let's use **Postman** to make some requests.

– Upload some files:

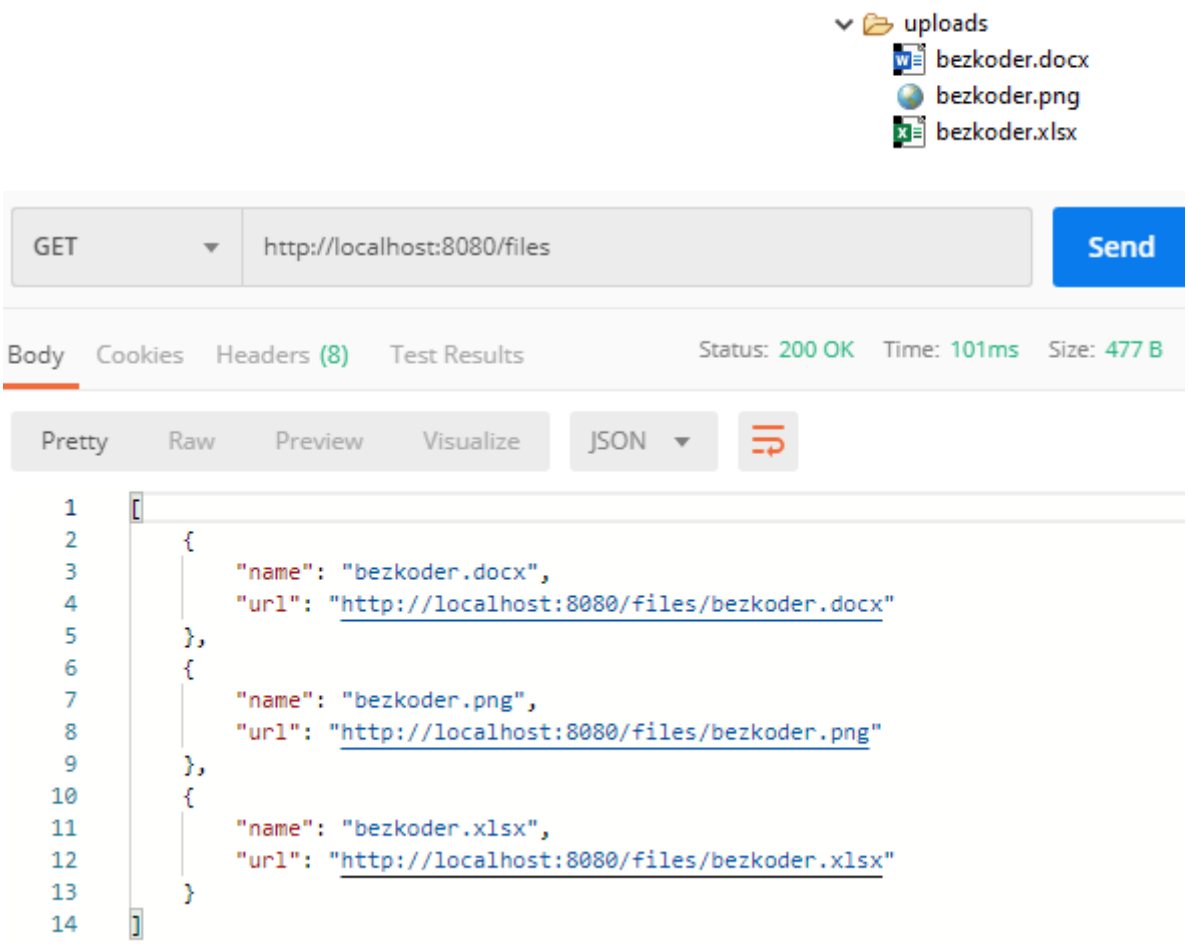


– Upload a file with size larger than max file size (500KB):



– Check **uploads** folder:

– Retrieve list of Files' information:



– Now you can download any file from one of the paths above.
For example: `http://localhost:8080/files/bezkoder.png`.

Conclusion

Today we've learned how to create Spring Boot File Upload Rest Api Application to upload multipart files and get files' information with static folder via Restful API.

Following tutorials explain how to build Front-end Apps to work with our Spring Boot Server:
– Angular 8 Client / Angular 10 Client / Angular 11 Client / Angular 12
– Angular Material 12
– Vue Client / Vuetify Client
– React Client / React Hooks Client
– Material UI Client
– React Image Upload with Preview

For multiple Files at once:
How to upload multiple files in Java Spring Boot

You can also know way to upload an Excel/CSV file and store the content in MySQL database with the post:
– Spring Boot: Upload/Import Excel file data into MySQL Database
– Spring Boot: Upload/Import CSV file data into MySQL Database

If you want to store files in database like this:

id	data	name	type
5d71322e-a954-4d7a-b0e6-7c799b5aae5f	BLOB	bezkoder.png	image/png
6ba3578c-ce22-4dd7-999e-72192bf31b53	BLOB	bezkoder.doc	application/msword
88108ee4-5354-4041-bfc6-2965fc8af4f4	BLOB	bezkoder.jpg	image/jpeg

You can find instruction at:
Spring Boot Upload/Download File to/from Database example

Happy Learning! See you again.

Further Reading

Multipart Content-Type

Source Code

You can find the complete source code for this tutorial on Github.