Deployment

1. Download tomcat 8.5.78 https://tomcat.apache.org/download-80.cgi
2. Unzip tomcat archive in any folder
3. Move to tomcat folder /webapps
4. Remove directory which called ROOT
5. Copy ROOT.war to /webapps
6. Move to tomcat folder /bin
7. Execute in command line (for Linux): catalina.sh jpda start
8. Be sure that tomcat started. You should see “Tomcat started.” line

```
Using CATALINA_BASE:   /home/alexandr/_git/apache-tomcat-8.5.78
Using CATALINA_HOME:   /home/alexandr/_git/apache-tomcat-8.5.78
Using CATALINA_TMPDIR: /home/alexandr/_git/apache-tomcat-8.5.78/temp
Using JRE_HOME:        /usr/lib/jvm/jdk1.8.0_241
Using CLASSPATH:       /home/alexandr/_git/apache-tomcat-8.5.78/bin/bootstrap.jar:/home/alexandr/_git/apache-tomcat-8.5.78/bi
n/tomcat-juli.jar
Using CATALINA_OPTS:
Tomcat started.
```

9. Be sure that application started. Open file: /logs/catalina.out
   You should see:

```
 ______.         [  |            (_)  / |_  / |_
|_   _ `.         | |    .--.    __  `| |-'`| |-' .---.
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  | |  | |/ /__\\ | |  | \__. |  | |  | |,  | |, | \__.,
 _| |_.' /| \__., | |   '.__.'  [___] \__/  \__/  '.__.'
|______.'  '.__.' [___]

Deloitte 1.0.0
Powered by Spring Boot 2.6.7
2022-05-15 12:27:13.785  INFO 21166 --- [ost-startStop-1] com.deloitte.DeloitteApplication         : Starting DeloitteApplication v1.0.0 using Java 1.8.0_241 on alexandr-HP-ProBook-450-G6 with PID 21166 (/home/alexandr/_git/apache-tomcat-8.5.78/
webapps/ROOT/WEB-INF/classes started by alexandr in /home/alexandr/_git/apache-tomcat-8.5.78/bin)
2022-05-15 12:27:13.788  INFO 21166 --- [ost-startStop-1] com.deloitte.DeloitteApplication         : No active profile set, falling back to 1 default profile: "default"
2022-05-15 12:27:14.337  INFO 21166 --- [ost-startStop-1] .s.d.r.c.RepositoryConfigurationDelegate : Bootstrapping Spring Data JPA repositories in DEFAULT mode.
2022-05-15 12:27:14.383  INFO 21166 --- [ost-startStop-1] .s.d.r.c.RepositoryConfigurationDelegate : Finished Spring Data repository scanning in 38 ms. Found 2 JPA repository interfaces.
2022-05-15 12:27:14.715  INFO 21166 --- [ost-startStop-1] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: initialization completed in 905 ms
2022-05-15 12:27:14.936  INFO 21166 --- [ost-startStop-1] o.s.j.d.e.EmbeddedDatabaseFactory        : Starting embedded database: url='jdbc:hsqldb:mem:deloitte', username='sa'
2022-05-15 12:27:15.297  INFO 21166 --- [ost-startStop-1] o.hibernate.jpa.internal.util.LogHelper  : HHH000204: Processing PersistenceUnitInfo [name: default]
2022-05-15 12:27:15.345  INFO 21166 --- [ost-startStop-1] org.hibernate.Version                    : HHH000412: Hibernate ORM core version 5.6.8.Final
2022-05-15 12:27:15.500  INFO 21166 --- [ost-startStop-1] o.hibernate.annotations.common.Version   : HCANN000001: Hibernate Commons Annotations {5.1.2.Final}
2022-05-15 12:27:15.614  INFO 21166 --- [ost-startStop-1] org.hibernate.dialect.Dialect            : HHH000400: Using dialect: org.hibernate.dialect.HSQLDialect
2022-05-15 12:27:16.174 DEBUG 21166 --- [ost-startStop-1] org.hibernate.SQL                        : create table users_tasks (user_entity_id bigint not null, tasks_id bigint not null, primary key (user_entity_id, tasks_id))
2022-05-15 12:27:16.176 DEBUG 21166 --- [ost-startStop-1] org.hibernate.SQL                        : alter table users_tasks drop constraint UK_ntgmxrnn2x6w47tltwj5d1fyt
2022-05-15 12:27:16.177 DEBUG 21166 --- [ost-startStop-1] org.hibernate.SQL                        : alter table users_tasks add constraint UK_ntgmxrnn2x6w47tltwj5d1fyt unique (tasks_id)
2022-05-15 12:27:16.178 DEBUG 21166 --- [ost-startStop-1] org.hibernate.SQL                        : alter table users_tasks add constraint FKphskmyjd10svfk7iwnda2rib0 foreign key (tasks_id) references tasks
2022-05-15 12:27:16.179 DEBUG 21166 --- [ost-startStop-1] org.hibernate.SQL                        : alter table users_tasks add constraint FKry3irsv08bi569sg2cmjhwtvv foreign key (user_entity_id) references users
2022-05-15 12:27:16.180  INFO 21166 --- [ost-startStop-1] o.h.e.t.j.p.i.JtaPlatformInitiator       : HHH000490: Using JtaPlatform implementation: [org.hibernate.engine.transaction.jta.platform.internal.NoJtaPlatform]
2022-05-15 12:27:16.187  INFO 21166 --- [ost-startStop-1] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2022-05-15 12:27:16.811  WARN 21166 --- [ost-startStop-1] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure
spring.jpa.open-in-view to disable this warning
2022-05-15 12:27:17.020  INFO 21166 --- [ost-startStop-1] o.s.s.web.DefaultSecurityFilterChain     : Will secure any request with [org.springframework.security.web.context.request.async.WebAsyncManagerIntegrationFilter@7981f0ea,
org.springframework.security.web.context.SecurityContextPersistenceFilter@706b45b6, org.springframework.security.web.header.HeaderWriterFilter@4c407ab2, org.springframework.security.web.authentication.logout.LogoutFilter@164f153e,
org.springframework.security.web.authentication.UsernamePasswordAuthenticationFilter@1a65ee81, org.springframework.security.web.savedrequest.RequestCacheAwareFilter@41567b61,
org.springframework.security.web.servletapi.SecurityContextHolderAwareRequestFilter@12ca1566, org.springframework.security.web.authentication.AnonymousAuthenticationFilter@a1c333a,
org.springframework.security.web.session.SessionManagementFilter@577c562e, org.springframework.security.web.access.ExceptionTranslationFilter@215dc9a0, org.springframework.security.web.access.intercept.FilterSecurityInterceptor@5e3921fc]
2022-05-15 12:27:17.289  INFO 21166 --- [ost-startStop-1] o.s.b.a.w.s.WelcomePageHandlerMapping    : Adding welcome page: class path resource [static/index.html]
2022-05-15 12:27:17.483  INFO 21166 --- [ost-startStop-1] com.deloitte.DeloitteApplication         : Started DeloitteApplication in 4.075 seconds (JVM running for 6.224)
15-May-2022 12:27:17.525 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployWAR Deployment of web application archive [/home/alexandr/_git/apache-tomcat-8.5.78/webapps/ROOT.war] has finished in [5_740] ms
15-May-2022 12:27:17.526 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Установка веб приложения в папку [/home/alexandr/_git/apache-tomcat-8.5.78/webapps/examples]
15-May-2022 12:27:17.660 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deployment of web application directory [/home/alexandr/_git/apache-tomcat-8.5.78/webapps/examples] has finished in [134] ms
15-May-2022 12:27:17.660 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Установка веб приложения в папку [/home/alexandr/_git/apache-tomcat-8.5.78/webapps/host-manager]
15-May-2022 12:27:17.677 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deployment of web application directory [/home/alexandr/_git/apache-tomcat-8.5.78/webapps/host-manager] has finished in [17] ms
15-May-2022 12:27:17.677 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Установка веб приложения в папку [/home/alexandr/_git/apache-tomcat-8.5.78/webapps/docs]
15-May-2022 12:27:17.689 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deployment of web application directory [/home/alexandr/_git/apache-tomcat-8.5.78/webapps/docs] has finished in [11] ms
15-May-2022 12:27:17.689 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Установка веб приложения в папку [/home/alexandr/_git/apache-tomcat-8.5.78/webapps/manager]
15-May-2022 12:27:17.703 INFO [localhost-startStop-1] org.apache.catalina.startup.HostConfig.deployDirectory Deployment of web application directory [/home/alexandr/_git/apache-tomcat-8.5.78/webapps/manager] has finished in [14] ms
15-May-2022 12:27:17.706 INFO [main] org.apache.coyote.AbstractProtocol.start Starting ProtocolHandler ["http-nio-8080"]
15-May-2022 12:27:17.724 INFO [main] org.apache.catalina.startup.Catalina.start Server startup in 5973 ms
```

10. To stop the application you should move to tomcat folder /bin
    Execute via command line (for Linux): ./shutdown.sh
11. Open the application using the URL: http://localhost:8080/api/v1/tasks
    8080 - default port
    8000 - debug port

USING THE APPLICATION

There are 3 users in the application:
№1
login: test
password: pwd123
role: admin

№2
login: test2
password: pwd1234
role: admin

№3
login: test3
password: pwd12345
role: user

There are 2 roles in the application:
admin - create, read, update, delete operations are available to you
user - read operation is available to you

EXPLANATIONS

Why certain approaches were used, why others were not selected

Technology stack:
Java 8, Spring Boot 2 (Web, Security, Data JPA), Thymeleaf, Lombok, HSQL (in-memory), Maven, Tomcat 8.5, IntelliJIdea, git

- Java 8 was used because higher versions are inappropriate for tomcat 8.5
- Spring Boot was used because it is a good way to build an application without detailed settings and also it has a lot of features right from the box. Also, it is a good framework because it has a lot of documentations and has a large community
- Thymeleaf - I used to work with JSP, but I've read the article that JSP may not work correctly with the Spring Boot, so I decided to use Thymeleaf. Also, I worked with Vaadin, but in my opinion it is to heavy for my purposes
- Lombok library was used to exclude boilerplate code
- HSQL 2.5.2 was used because higher versions are inappropriate for Java 8. HSQL is very useful for debugging and demonstration purposes
- Maven - we also can use Gradle build system, so, in my opinion, both variants are possible
- IntelliJIdea - IDE which has excellent integration with above technologies

Any design patterns used

I have devided the application into 5 layers (components):
1. html - used as a view
2. controller - integration point between view and application business logic
3. service - business logic
4. repository - integration point between business logic and database
5. database - data storage

Anything extra you would have done give more time

1. web interface - I would add css and refactor controls location, because current interface has absolutely functional meaning
2. add pagination and sorting for tasks list
3. change security system and use JSON Web Tokens (JWT)
4. add cache to database interactions
5. add indexes to database tables
6. Logging
7. read configuration properties from external file
8. input params validation
9. configure Liquibase for data migration control
10. authorization through social networks
11. create CRUD operations not only for tasks, but also for users