

# Web Technologies Project @ PoliMi, 2025

Creating a Playlist Manager with Thymeleaf & JS

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# 1. Original submission (in Italian)

## 1.1. Versione HTML pura

Un'applicazione web consente la gestione di una playlist di brani musicali. Playlist e brani sono personali di ogni utente e non condivisi. Ogni utente ha username, password, nome e cognome. Ogni brano musicale è memorizzato nella base di dati mediante un titolo, l'immagine e il titolo dell'album da cui il brano è tratto, il nome dell'interprete (singolo o gruppo) dell'album, l'anno di pubblicazione dell'album, il genere musicale (si supponga che i generi siano prefissati) e il file musicale. Non è richiesto di memorizzare l'ordine con cui i brani compaiono nell'album a cui appartengono. Si ipotizzi che un brano possa appartenere a un solo album (no compilation). L'utente, previo login, può creare brani mediante il caricamento dei dati relativi e raggrupparli in playlist. Una playlist è un insieme di brani scelti tra quelli caricati dallo stesso utente. Lo stesso brano può essere inserito in più playlist. Una playlist ha un titolo e una data di creazione ed è associata al suo creatore. A seguito del login, l'utente accede all'HOME PAGE che presenta l'elenco delle proprie playlist, ordinate per data di creazione decrescente, un form per caricare un brano con tutti i dati relativi e un form per creare una nuova playlist. Il form per la creazione di una nuova playlist mostra l'elenco dei brani dell'utente ordinati per ordine alfabetico crescente dell'autore o gruppo e per data crescente di pubblicazione dell'album a cui il brano appartiene. Tramite il form è possibile selezionare uno o più brani da includere. Quando l'utente clicca su una playlist nell'HOME PAGE, appare la pagina PLAYLIST PAGE che contiene inizialmente una tabella di una riga e cinque colonne. Ogni cella contiene il titolo di un brano e l'immagine dell'album da cui proviene. I brani sono ordinati da sinistra a destra per ordine alfabetico crescente dell'autore o gruppo e per data crescente di pubblicazione dell'album a cui il brano appartiene. Se la playlist contiene più di cinque brani, sono disponibili comandi per vedere il precedente e successivo gruppo di brani. Se la pagina PLAYLIST mostra il primo gruppo e ne esistono altri successivi nell'ordinamento, compare a destra della riga il bottone SUCCESSIVI, che permette di vedere il gruppo successivo. Se la pagina PLAYLIST mostra l'ultimo gruppo e ne esistono altri precedenti nell'ordinamento, compare a sinistra della riga il bottone PRECEDENTI, che permette di vedere i cinque brani precedenti. Se la pagina PLAYLIST mostra un blocco e esistono sia precedenti sia successivi, compare a destra della riga il bottone SUCCESSIVI e a sinistra il bottone PRECEDENTI. La pagina PLAYLIST contiene anche un form che consente di selezionare e aggiungere uno o più brani alla playlist corrente, se non già presente nella playlist. Tale form presenta i brani da scegliere nello stesso modo del form usato per creare una playlist. A seguito dell'aggiunta di un brano alla playlist corrente, l'applicazione visualizza nuovamente la pagina a partire dal primo blocco della playlist. Quando l'utente seleziona il titolo di un brano, la pagina PLAYER mostra tutti i dati del brano scelto e il player audio per la riproduzione del brano.

## 1.2. Versione con JavaScript

Si realizzi un'applicazione client server web che modifica le specifiche precedenti come segue:

- Dopo il login dell'utente, l'intera applicazione è realizzata con un'unica pagina.
- Ogni interazione dell'utente è gestita senza ricaricare completamente la pagina, ma produce l'invocazione asincrona del server e l'eventuale modifica del contenuto da aggiornare a seguito dell'evento.

- L'evento di visualizzazione del blocco precedente/successivo è gestito a lato client senza generare una richiesta al server.
- L'applicazione deve consentire all'utente di riordinare le playlist con un criterio personalizzato diverso da quello di default. Dalla HOME con un link associato a ogni playlist si accede a una finestra modale RIORDINO, che mostra la lista completa dei brani della playlist ordinati secondo il criterio corrente (personalizzato o di default). L'utente uò trascinare il titolo di un brano nell'elenco e di collocarlo in una posizione diversa per realizzare l'ordinamento che desidera, senza invocare il server. Quando l'utente ha raggiunto l'ordinamentodesiderato, usa un bottone "salva ordinamento", per memorizzare la sequenza sul server. Ai successivi accessi, l'ordinamento personalizzato è usato al posto di quello di default. Un brano aggiunto a una playlist con ordinamento personalizzato è inserito nell'ultima posizione.

## 2. Project submission breakdown

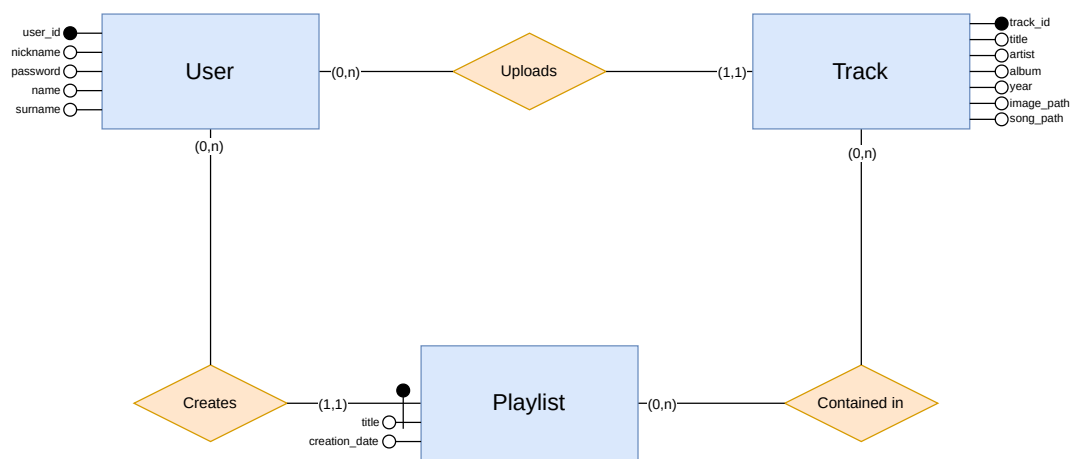
### 2.1. Database logic

<b>LEGEND</b>	<b>Entity</b>	<b>Attribute</b>	<i>Attribute specification</i>	<b>Relationship</b>
---------------	---------------	------------------	--------------------------------	---------------------

Each **user** has a **username**, **password**, **name** and **surname**. Each musical **track** is stored in the database by **title**, **image**, **album title**, **album artist name** (single or group), **album release year**, **musical genre** and **file**. Furthermore:

- Suppose the *genres are predetermined* // the user cannot create new genres
- It is not requested to store the track order within albums
- Suppose each track can belong to a unique album (no compilations)

After the login, the user is able to **create tracks by loading their data and then group them in playlists**. A **playlist** is a *set of chosen tracks from the uploaded ones of the user*. A playlist has a **title**, a **creation date** and is **associated to its creator**.



(a) ER diagram, .

(b) UML diagram.

Figure 1: Database diagrams.

### 2.2. Behaviour

<b>LEGEND</b>	<b>User action</b>	<b>Server action</b>	<b>HTML page</b>	<b>Page element</b>
---------------	--------------------	----------------------	------------------	---------------------

After the login, the user **accesses** the **HOME PAGE** which displays the list of their playlists, ordered by descending creation date; a **form to load a track with relative data** and a **form to create a new playlist**. The playlist form:

- **Shows** the list of user tracks ordered by artist name in ascending alphabetic order and by ascending album release date

- The form allows to select one or more tracks

When a user clicks on a playlist in the **HOME PAGE**, the application loads the **PLAYLIST PAGE** initially, it contains a table with a row and five columns.

- Every cell contains the track's title and album name
- The tracks are ordered from left to right by artist name in ascending alphabetic order and by ascending album release date
- If a playlist contains more than 5 tracks, there are available commands to see the others (in blocks of five)

**Playlist tracks navigation** If the **PLAYLIST PAGE**:

1. Shows the first group and there are subsequent ones, a NEXT button appears on the right side of the row
2. Shows the last group and there are precedent ones, a PREVIOUS button appears on the left side of the row that allows to see the five precedent tracks
3. Shows a block of tracks and there are both subsequent and precedent ones, then on left and the right side appear both previous and next button

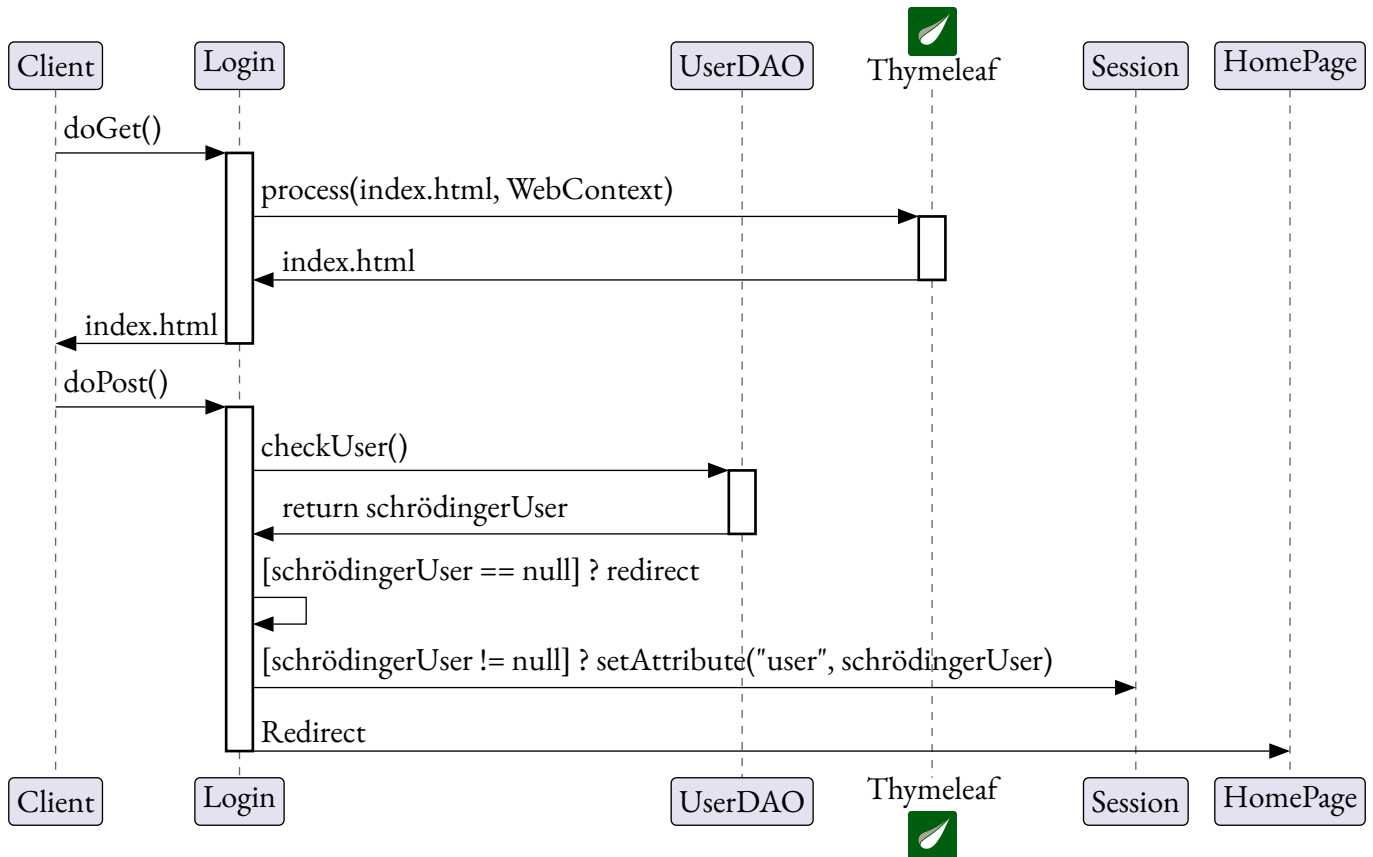
**Track creation** The **PLAYLIST PAGE** includes a **form that allows to add one or more tracks to the current playlist, if not already present**. This form acts in the same way as the playlist creation form.


After adding a new track to the current playlist, the application **refresh the page display** from the first block of the playlist (the first 5 tracks). Once a user **selects the title of a track**, the **PLAYER PAGE** **shows** all of the **track data** and the **audio player**.

Figure 2: IFML diagram.

### 3. Sequence diagrams

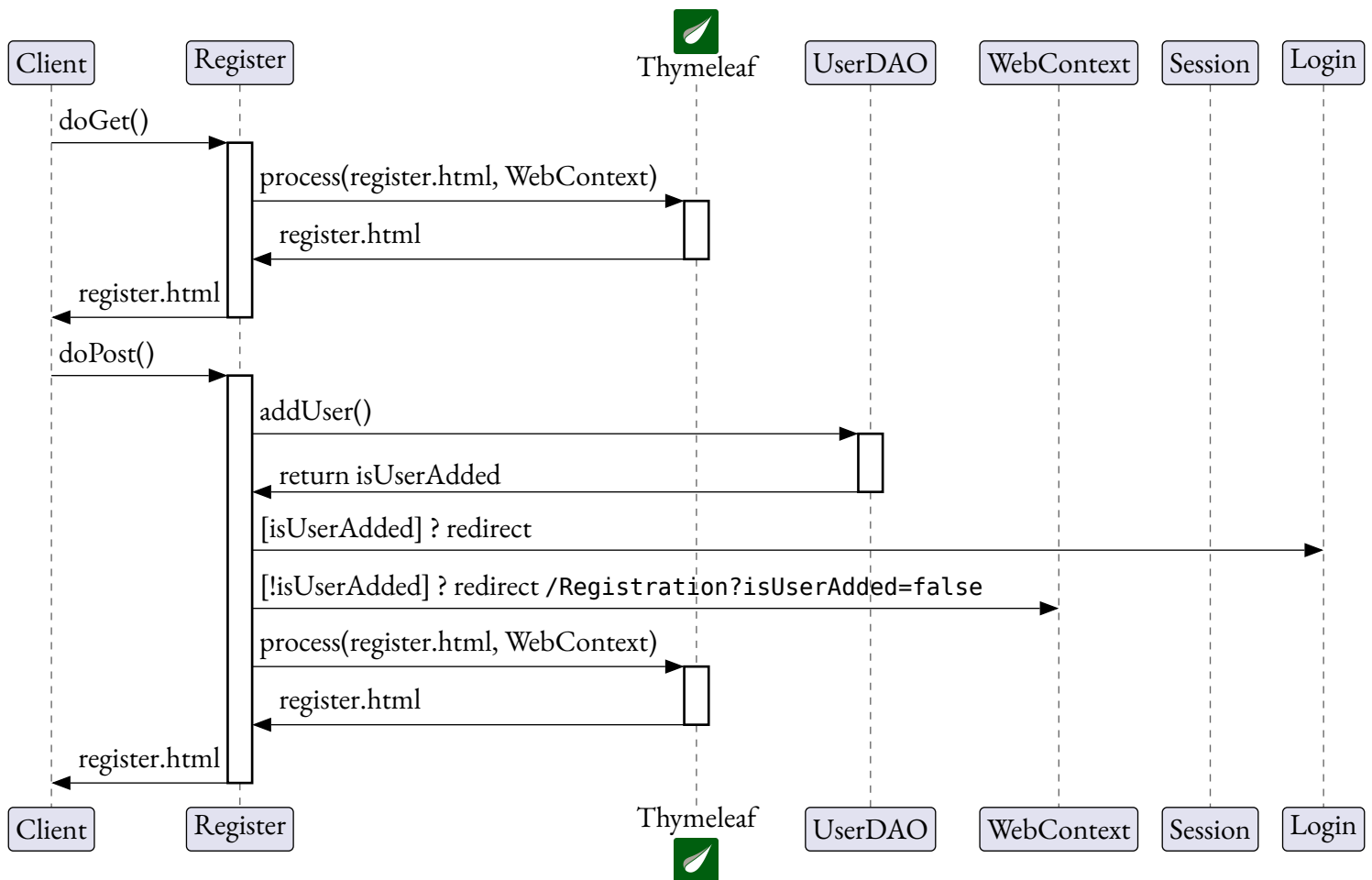
#### 3.1. Login sequence diagram



**Comment** — Once the server is up and running, the Client requests the Login page. Then, thymeleaf  processes the request and returns the correct context, to index the chosen locale. Afterwards, the User inserts their credentials.


Those values are passed to the `checkUser()` function that returns `schrödingerUser` – as the name implies, the variable might return a User; otherwise `null`. If `null`, then the credentials inserted do not match any record in the database; else the User is redirected to their HomePage and the `user` variable is set for the current session.

### 3.2. Register sequence diagram



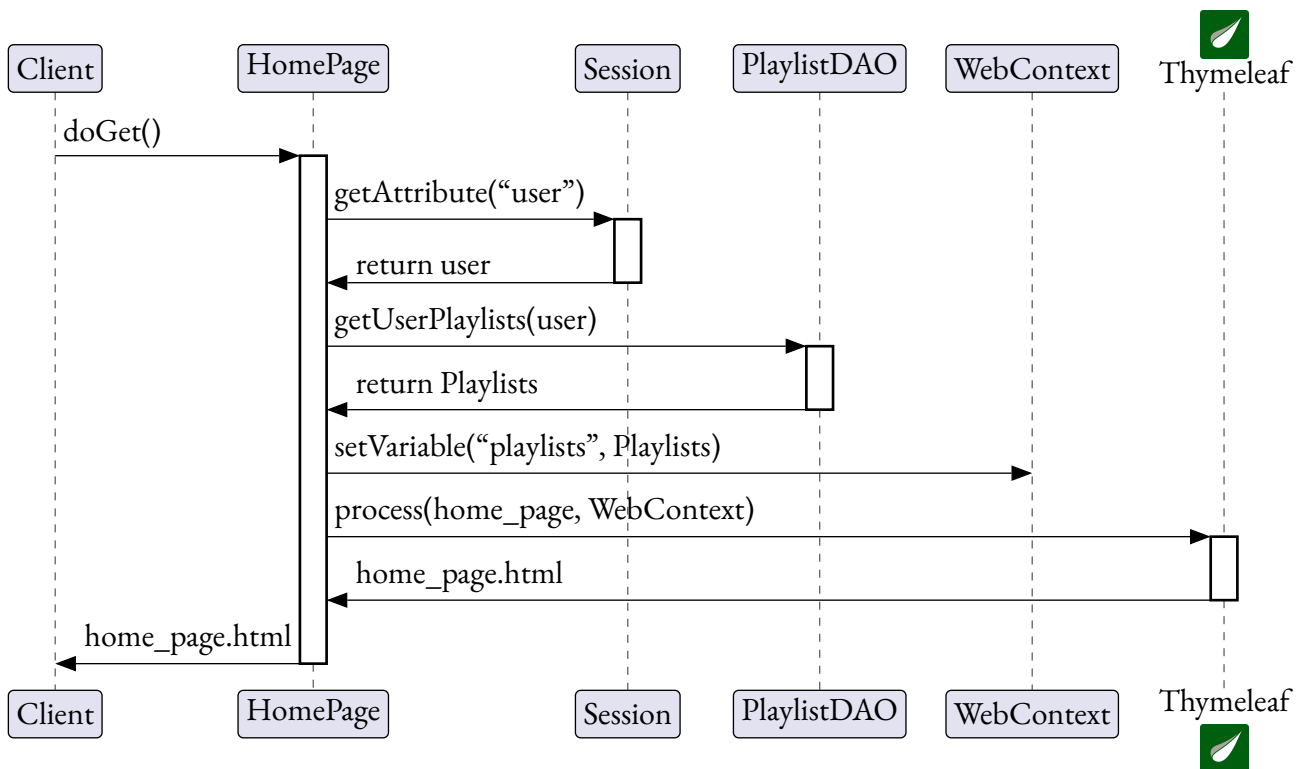
**Comment** — If the User is not yet registered, they might want to create an account. If that's the case, as per the Login sequence diagram, initially thymeleaf  processes the correct context, then the User inserts the credentials.


Depending on the nickname inserted, the operation might fail: there can't be two Users with the same nickname. If that does not happen, then `isUserAdded` is true, then there will be the redirection to the Login page.

Else the program appends `isUserAdded` with false value and redirects to the Registration servlet: thymeleaf  checks for that context variable and if it evaluates to false, it prints an error.

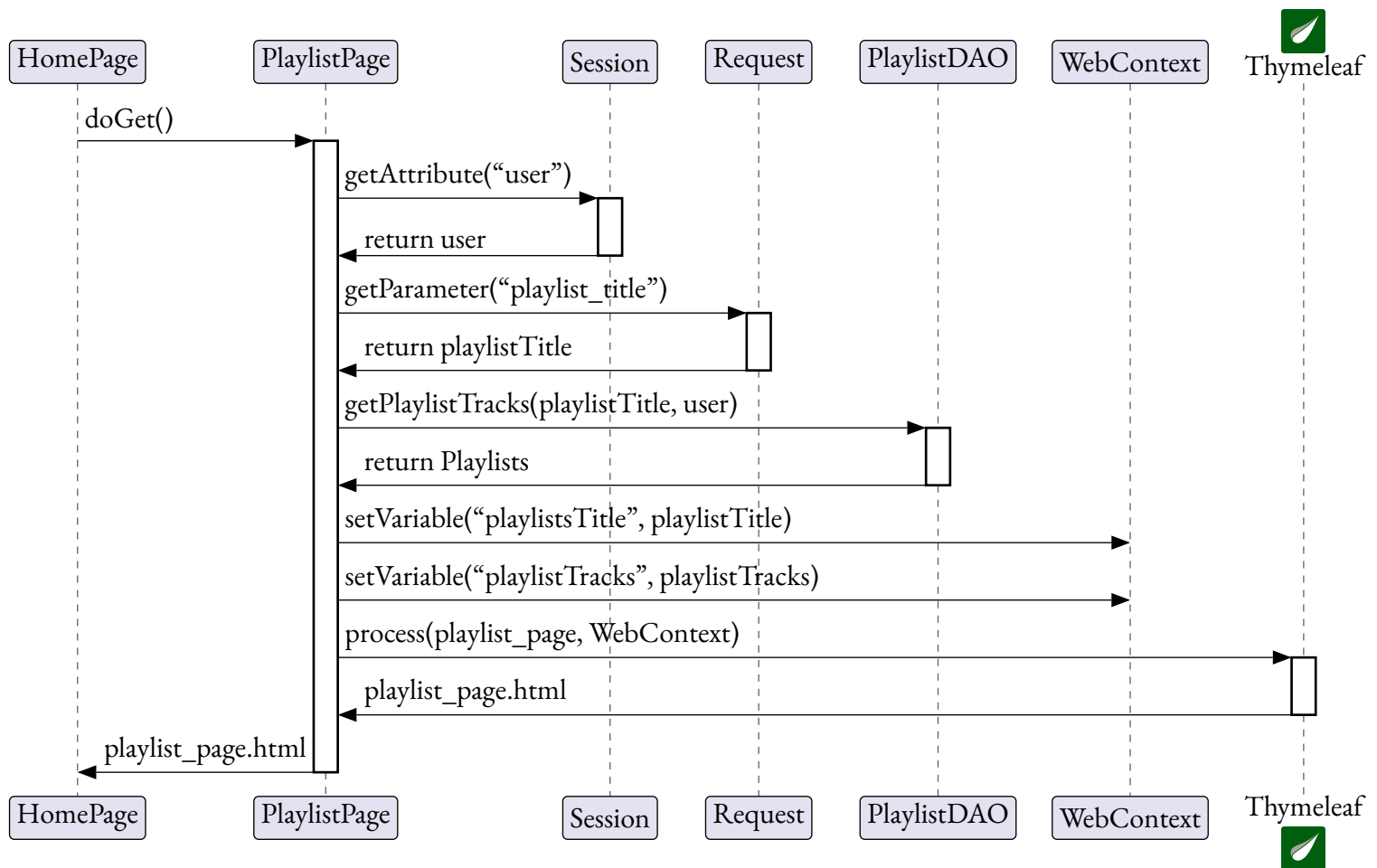


### 3.3. HomePage sequence diagram



**Comment** — Once the Login is complete, the User is redirected to their HomePage, which hosts all their Playlists. In order to do so, the program needs to User attribute – which is retrieved via the session; then, it is passed to the `getUserPlaylists` function and finally `thymeleaf`  displays all values.

### 3.4. PlaylistPage sequence diagram

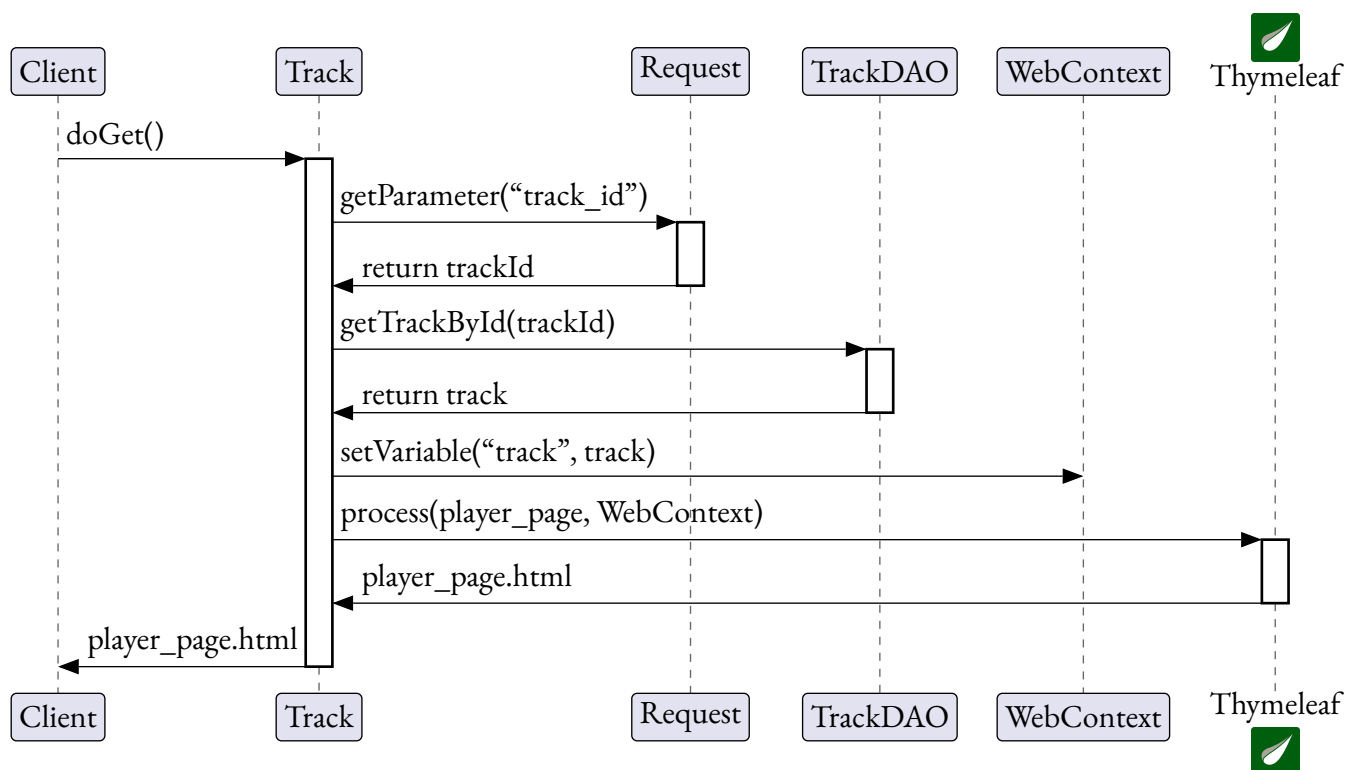


**Comment** — From the *HomePage*, the User is able to see all their playlists. By clicking on either one of them, the program redirects to the corresponding *PlaylistPage*, which lists all the tracks associated to that playlist.


In order to do so, the program needs the User attribute – which is retrieved via the session – and the title of the playlists, which is given as a parameter by pressing the corresponding button in *HomePage*.

Then those value are passed to `getPlaylistTracks()`, that returns all the tracks. Finally, *thymeleaf* processes the context and display all the tracks.

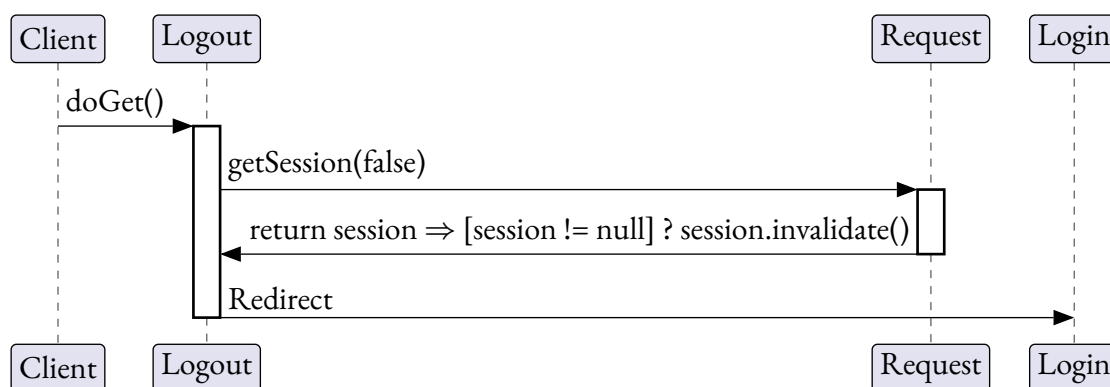
### 3.5. Track sequence diagram



**Comment** — Once the User has displayed all the tracks from a playlist, the program allows to play them, individually. Similarly to the `getPlaylistTracks()`, to retrieve all the informations about a single track the program is given the `track_id` parameter by pressing the corresponding button.

Finally, `getTrackById()` returns the track metadata, *thymeleaf*  processes the context and display all the informations.

### 3.6. Logout sequence diagram



**Comment** — From nearly every page, the User is able to logout, at any moment. It's a GET request to the Logout servlet: it invalidates the session and redirects the User to the Login page.

## 4. CSS styling

**Introduction** The project is based on a single CSS files, `components.css`, and all the others rely upon it to display the styles. Furthermore, all the colours are sourced from the `colors.css` file, which is itself is based on *tinted-theming* [1], a collection of commonly used themes in the developing world. We have chosen to use the *Classic Light theme*<sup>1</sup>.

If you want to change the overall theme of the website, just switch to a new colorscheme by looking at the [gallery](#).

```
body {
  background-color: var(--default-background);
  padding: 1rem 2rem 2rem 2rem;
  line-height: 1.6;
  word-spacing: 1px;
  font-family: "JetBrains Mono", monospace;
  height: 100vh;
  text-overflow: ellipsis;
}
```

**Comment** — As stated earlier, the `background-color` is sourced from the `colors.css`. Then the padding is always `2rem`, except above, where it's `1rem`. The text is able to wrap thanks to `ellipsis` option on `text-overflow`.

After the body, we styled all the elements in a consistent manner.

### 4.1. Buttons

```
.button {
  color: var(--selection-background);
  background-color: var(--default-foreground);
  border: 2px solid var(--dark-foreground);
  height: 3rem;
  border-radius: 6px;
  font-weight: bold;
  vertical-align: middle;
  margin: 0.5rem 0 0.5rem 0;
  padding: 1em;
  font-family: "JetBrains Mono", monospace;
}
```

**Comment** — Every button is derived from the one above. The text is aligned in the center both horizontally and vertically, bold. Then there are some margin and padding to help the user see better<sup>2</sup>.

A notable exception to the buttons colorscheme is the `logout` button:

<sup>1</sup>Very similar to [NothingOS](#) colorscheme.

<sup>2</sup>There will be later an exception.

```
.logout {
  background-color: var(--variables);
  font-weight: bolder;
  color: var(--lighter-background);
}

.logout:hover {
  background-color: var(--data-types);
}
```

**Comment** — Both the background-color, font-weight and color are different, to further imply that button is different from the others (upload track, create playlist...).

The same can be said to the close button in the modal, will be explained below.

## 4.2. Containers

The first container the user encounters is the Login one, which shares its design with Register and the track player:

```
.center-panel {
  width: 300px;
  background-color: var(--lighter-background);
  border: 1px solid var(--dark-foreground);
  padding: 3rem;
  text-align: center;
}
```

**Comment** — An important aspect of login and register is their horizontal bar:

```
hr {
  display: block;
  height: 1px;
  border: 0;
  border-top: 1px solid var(--light-background);
  margin: 1em 0;
  padding: 0;
}
```

which is not used in the track player.

A central part of a Playlist Manager is displaying all the playlist and tracks of a given user. To achieve that, we opted for a classic layout composed of a top and bottom navigation bars and a main section.

```
.nav-bar {
  width: 100%;
  margin: 0;
```

```

display: flex;
flex-wrap: wrap;
align-content: space-around;
justify-content: center;
align-items: center;
gap: 1rem;
}

```

**Comment** — The navigation bar is the same both above and below. It's a flex container because it's important to have a flexible container for the main-title (e.g. "All Playlists") and the buttons (with a variable number between screens).

The layout is computed as follows:



so we created the spacer element:

```

.spacer {
  flex-grow: 1;
}

```

which takes all the space available.

Next, the tracks and playlists containers.

```

.items-container {
  width: 100%;
  display: grid;
  grid-template-columns: 1fr 1fr 1fr 1fr 1fr;
  align-content: baseline;
  justify-content: center;
  gap: 1rem;
  padding: 1rem 0 1rem 0;
}

.single-item {
  display: flex;
  flex-wrap: nowrap;
  background-color: var(--light-background);
  border: 2px solid var(--data-types);
  border-radius: 5px;
  color: var(--lighter-background);
  padding: 1rem;
  height: 150px;
  font-family: "JetBrains Mono", monospace;
  font-weight: 700;
  text-align: left;
  align-content: end;
  align-items: end;
}

```

```

    justify-content: space-between;
}

.single-item:hover {
    background-color: var(--variables);
    cursor: pointer;
}

```

**Comment** — According to project specifications, there must be **at most 5 tracks per page**: we opted for a CSS grid. This works well along with the body previously set because the grid can expand and shrink its items accordingly.

As per the navigation bar, the single items are themselves flexible boxes. The different is they are not allowed to wrap – one might ask: why not, since the tracks must list the title and the album? because we handle that line break manually with the `<br>` tag.

### 4.3. Modal

Finally, without a doubt the most difficult CSS component in this project is the modal, which is a dialog window created entirely with CSS. As a complex element, it can be broke into multiple parts:

- The window

```

.modal-window {
    position: fixed;
    background-color: rgba(255, 255, 255, 0.25);
    top: 0;
    right: 0;
    bottom: 0;
    left: 0;
    z-index: 999;
    visibility: hidden;
    pointer-events: none;
    transition: all 0.5s;
}

```

it's hidden by default, but once it's invoked it must be above everything – this is handled by the `z-index` property. Its position must be `fixed`, since it's not a movable window; also it can't be targeted by `cursor: pointer` - events are none. Another key aspect is the background color: in order to make it stand from its background, a slight blurred white is needed:

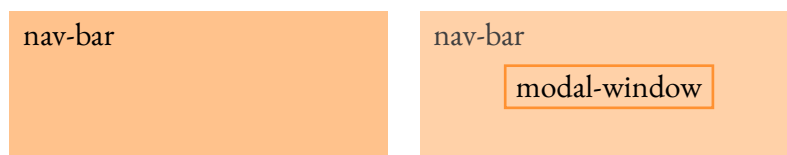


Figure 9: Modal representation.

- The target, when the user presses a button that launches the modal (e.g. Upload Track)

```
.modal-window:target {
  visibility: visible;
  opacity: 1;
  pointer-events: auto;
}

.modal-window > div {
  width: 400px;
  position: absolute;
  top: 50%;
  left: 50%;
  transform: translate(-50%, -50%);
  padding: 1em;
  background: var(--lighter-background);
  border: 2px solid var(--variables);
}
```

once the modal has been invoked, its visibility must be switched to `visible` and opacity to 1. The child element `div` of the window must at the center of screen, both horizontally and vertically: this is managed with the `top`, `left` and `translate` properties.

- The close button

```
.modal-close {
  color: var(--lighter-background);
  background-color: var(--variables);
  border-radius: 5px;
  position: absolute;
  top: 2%;
  right: 2%;
  cursor: pointer;
  padding: 0.2rem;
  font-size: 0.8rem;
  font-weight: bold;
  text-align: center;
  text-decoration: none;
}

.modal-close:hover {
  color: black;
}
```

as stated previously, the `modal-close` button is an exception to the `button` rule. It's considerably smaller than the others, the cursor is immediately `pointer`. In conclusion its position is computed on the `modal-window`, from above right.



## Bibliography

- [1] “Tinted Theming.” [Online]. Available: <https://github.com/tinted-theming/home>
- [2] “subpar package.” [Online]. Available: <https://typst.app/universe/package/subpar>
- [3] “chronos package.” [Online]. Available: <https://typst.app/universe/package/chronos>
- [4] “Draw.io.” [Online]. Available: <https://app.diagrams.net/>