Use Apache Velocity as template engine

Context and Problem Statement

We need to choose a template engine for custom export filters and AI features.

A discussion of template engines was also in one of the JabRef repos.

A discussion was raised on StackOverflow "Velocity vs. FreeMarker vs. Thymeleaf".

Decision Drivers

- It should be fast.
- It should be possible to provide templates out of `String`s (required by the AI feature).
- It should have short and understandable syntax. Especially, it should work well with unset fields and empty `Optional`s.

Considered Options

- Apache Velocity
- Apache FreeMarker
- Thymeleaf

Decision Outcome

Chosen option: "Apache Velocity", because "Velocity's goal is to keep templates as simple as possible" (source). It is sufficient for our use case. Furthermore, Apache Velocity is lightweight, and it allows to generate text output. This is a good fit for the AI feature.

Pros and Cons of the Options

Apache Velocity

- Main page: https://velocity.apache.org/.
- User guide: https://velocity.apache.org/engine/devel/user-guide.html.
- Developer guide: https://velocity.apache.org/engine/devel/developer-guide.html.

Example:

```
You are an AI assistant that analyses research papers. You answer questions about papers.


Here are the papers you are analyzing:
#foreach( $entry in $entries )
${CanonicalBibEntry.getCanonicalRepresentation($entry)}
#end
```

- Good, because supports plain text templating.
- Good, because it is possible to use `String` as a template.
- Good, because it has simple syntax, and it is designed for simple template workflows.
- Good, because it has a stable syntax (source).
- Bad, because it is in maintenance mode.
- Bad, because removed from Spring 5.0.1

Apache FreeMarker

- Main page: https://freemarker.apache.org/index.html.
- User guide: https://freemarker.apache.org/docs/dgui.html.
- Developer guide: https://freemarker.apache.org/docs/pgui_quickstart.html.

Example:

```
You are an AI assistant that analyzes research papers. You answer questions about papers.


Here are the papers you are analyzing:
<#list entries as entry>
${CanonicalBibEntry.getCanonicalRepresentation(entry)}
</#list>
```

- Good, because supports plain text templating.
- Good, because it is possible to use `String` as a template.
- Good, because in active development.
- Good, because it is powerful and flexible.
- Good, because it has extensive documentation (source).
- Neutral, because it has received some API and syntax changes recently (source).
- Neutral, because FreeMarker is used for complex template workflow, which we do not need in JabRef.

Thymeleaf

- Main page: https://www.thymeleaf.org/.
- Documentation: https://www.thymeleaf.org/doc/tutorials/3.1/usingthymeleaf.html.
```

Example:

```
You are an AI assistant that analyzes research papers. You answer questions about papers.


Here are the papers you are analyzing:
[# th:each="entry : ${entries}"]
[(${CanonicalBibEntry.getCanonicalRepresentation(entry)})]
[/]
```

- Good, because supports plain text templating.
- Good, because it is possible to use `String` as a template.
- Good, because it has [several template modes](), that helps to make HTML, XML, and other templates.
- Good, because it is powerful and flexible.
- Neutral, because the API is a bit more complex than the other options.
- Bad, because the syntax is more complex than the other options. Especially for text output.

More Information

As stated in [the template discussion issue](), we should choose a template engine, and then slowly migrate previous code and templates to the chosen engine.

Other template engines are discussed at [https://www.baeldung.com/spring-template-engines](), especially `#other-template-engines`. We did not find any other engine there worth switching to.