# LUWRAIN Books: DAISY for schools

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*The report presents the experience obtained in the school for the blind in the city of Tomsk during the experiment which implies creation of a cloud service automatically producing the DAISY audiobooks and utilizing the commercial TTS.*
*The advantages and the problems related to the work are described, as well as technical details of used software components.*
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The DAISY format, which plays a role of an international standard for audiobooks for the blind, was announced more than twenty years ago, but due to various reasons a really available variety of books published in this format remains very insufficient. In the meantime, the education materials in DAISY could bring significant benefits to studying of the blind pupils and students since they are more convenient than the traditional materials prepared in the Braille notation.

In 2018 the collaboration of specialists from Tomsk State University, Tomsk State Pedagogical University and the school for the blind in Tomsk has been started to get a software solution which potentially could increase the comfort of educational process of the blind. Early 2021 the members of this collaboration started a learning experiment in the school for the blind which we will describe below.

The idea of the experiment revolves around the cloud service, launched by our team at https://books.luwrain.org, where the teachers can upload any text document in the DOCX format with a little of special markup. After that, the service automatically transforms it to the complete DAISY audiobook utilizing one of the commercial text-to-speech engines. The book, once it is prepared as a DAISY audiobook, becomes available for all pupils of the group selected by the teacher.

Pupils have a special application built on the LUWRAIN platform. It contains a DAISY reader connected to the cloud service through the publicly available API. The application is free, contains the free com-

ponents only, fully accessible without dependencies on any other accessibility technologies and supports both Microsoft Windows and GNU/Linux.

The LUWRAIN platform makes the construction of apps for the blind and partially-sighted significantly more easy than using the traditional UI with the screen reading software running on it. The platform core is written in the Java language, while the client applications can be created with even more easily understandable languages, like Kotlin, which we recommend to use at the moment.

Java gives a lot of advantages, the more preferable one is the portability across operating systems, including GNU/Linux. GNU/Linux has some accessibility technologies, but they are still not so well-developed as their alternatives for Microsoft Windows. Using of GNU/Linux is highly preferable for any state organizations, so according to our experience this is the only suitable option to get Linux-based approach to the education of the blind. The distributions which can be built with the LUWRAIN platform includes a self extracted installer for Microsoft Windows, a tarball for GNU/Linux and a ISO image on Ubuntu Linux 20.04.

The LUWRAIN core provides the following components:

- The library of accessible controls

- The application template

- Scripting tools based on GraalVM

- Some natural language processing

- Playing of audio streams

- Classes for network interaction

The experimental lessons with the materials in the DAISY format result in rather positive opinion of pupils and teachers. However, some difficulties which are listed below were highlighted.

The main problem with the DAISY format is related to the copyright rules. All rights on education materials belong to their publishers, and the Russian law prohibits any adaptation work without explicit permission of the owner. There are some exceptions which make the service still useful: the materials in public domain, the materials for personal using only etc.

We are highly committed to the idea of Open Source software, but still see a lot of uncertainty about the ways for developing an educational software under this model. The current plans of future developing include the LUWRAIN tools for editing TeX and Lilypond sources, but the resources available to the projects remains very insufficient. The blind people themselves usually don't have enough qualification for developing software on Java, this make the process very slow.

# References

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