

Emacs-reveal: A software bundle to create OER presentations

Jens Lechtenbörger¹

¹ ERCIS, University of Münster, Germany

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Software

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Introduction

According to the *Ljubljana OER Action Plan 2017* (UNESCO, 2017), “Open Educational Resources (OER) support quality education that is equitable, inclusive, open and participatory.” However, several challenges are known that hinder widespread creation, use, and re-use of OER. The first challenge identified in the Action Plan lies in “the capacity of users to find, re-use, create, and share OER”, and the first action category addressing that challenge, “Building awareness and skills to use OER”, lists ten actions, among which action (c) reads as follows: “Disseminate the findings of research on OER to support models of good practice with a focus on cost-effectiveness, sustainability, exploration of new tools and technologies for the creation and sharing of OER”.

Emacs-reveal (Lechtenbörger, 2019a) is a Free/Libre and Open Source Software (FLOSS) bundle (combining novel and established FLOSS components) in accordance with action (c). Briefly, emacs-reveal is a software tool, embedded in a powerful Continuous Integration infrastructure, to create and (re-) use OER slideshows (for courses and talks) with references and embedded multimedia contents such as figures, audio explanations, animations, videos, quizzes, and live code execution. The software simplifies creation and re-use of OER by addressing OER-specific requirements as summarized next.

Technical requirements for OER

For educational resources to be free and open, next to proper licensing requirements also technical requirements exist (as defined in the ALMS framework (Hilton, Wiley, Stein, & Johnson, 2010), extended in (Lechtenbörger, 2019b)):

- OER should be usable (for learning) with FLOSS on (almost) any device, also mobile and offline.
- OER should be editable with FLOSS (this requires source file access).
- OER should be re-usable under the Single Sourcing paradigm (see (Rockley, 2001)), which enables reuse and revision from a single, consistent source without copy&paste (copy&paste creates isolated copies, where the reconciliation of changes and improvements by different individuals would be almost impossible).
- OER should offer a separation of contents from layout (then, experts for content do not need to be design experts as well; also, cross-organizational collaboration is supported where each organization can apply its own design guidelines).
- OER should be defined in a lightweight markup language, which is easy to learn and which enables the use of industrial-strength version control systems such as Git for the management of OER collaboration (comparison, revision, merge).

Statement of Need

In spring 2017, the author was looking for FLOSS to create OER presentations with audio explanations for teaching and self-study that satisfies the above requirements. OER were meant for a course on Operating Systems, which was about to be transformed from more traditional lecturing to Just-in-Time Teaching (JiTT, see (Novak, 2011)) in the context of a fellowship for innovation in digital university teaching funded by the Ministry of Innovation, Science and Research of the State of North Rhine-Westphalia, Germany, and Stifterverband, Germany.

JiTT relies on students' self-study, and for subjective reasons the author decided to create presentations with audio explanations: While videos might be more popular, the author finds them difficult to create in high quality and difficult to use for learning (no skim reading, limited navigation and search, no hyperlinks). A survey result of [Lec19] justifies this decision: More students prefer emacs-reveal presentations over videos than the other way round.

To create such presentations, an initial analysis confirmed the need for “new tools and technologies for the creation and sharing of OER” identified in the Action Plan [Une17] cited above: Support for presentations created with software such as LibreOffice Impress on mobile devices was and still is limited, as is support for Single Sourcing and separation of contents from layout. Beamer LaTeX presentations (Wright, 2019) support Single Sourcing with separation of contents from layout, and generated PDF documents can embed audio files, but their playback using FLOSS on mobile devices was and still is limited. The author did not systematically analyze Wiki-style presentations, such as those created with SlideWiki (Auer, Khalili, & Tarasowa, 2013), because he was looking for support for Single Sourcing and collaboration based on the capabilities of decentralized version control systems such as Git (Chacon & Straub, 2014).

Emacs-reveal meets all of the above requirements, which lowers entry barriers towards a more widespread creation of OER. For OER creators, it simplifies licensing attribution when re-using figures with machine-readable meta-data based on an extension of CC REL (The Creative Commons Rights Expression Language, see (Abelson, Adida, Linksvayer, & Yergler, 2012)), (a) avoiding manual identification and copying of licensing information, which is among the most time-consuming factors for OER projects (Falconer, Littlejohn, McGill, & Beetham, 2016), and (b) making licensing information accessible on the Semantic Web (with RDFa in HTML) (Horrocks, 2008).

With emacs-reveal, source files for presentations are written in the lightweight markup language Org Mode (Schulte & Davison, 2011) (which is native to the text editor [GNU Emacs](#) but can be edited in any text editor and which is also used in other contexts to create modular and reusable teaching materials (Ro & Namkoong, 2019)) and converted to slideshows based on the HTML presentation framework [reveal.js](#). [Docker images for emacs-reveal](#) can be used to generate OER presentations in GitLab Continuous Integration infrastructures, notably a [Howto presentation](#) for emacs-reveal is maintained that way, as are [presentations](#) for the course on Operating Systems for which emacs-reveal was originally developed.

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