

How to Conduct Online Examinations Using Safe Exam Browser 2.0

eduhub Webinar

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The Safe Exam Browser

- How to secure your exam computers
- What is the Safe Exam Browser (SEB)?
- SEB's advantages
- New features

Questions to ask in the beginning

- What kind of examinations?
 - > Computer-based exams
 - > Online examinations
 - > Centralized exams

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- Which infrastructure to use for your examinations?
 - > Special assessment computer rooms?
 - > Computer lecture rooms?
 - > Student computers?

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- What kind of examinations?
 - > Computer-based exams
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- Which infrastructure to use for your examinations?
 - > Special assessment computer rooms?
 - > Computer lecture rooms?
 - > Student computers?
- How can you prevent manipulation, fraud, plagiarism and the obtaining of information from the Internet?

One possible answer ...



SEB

Safe
Exam
Browser

What is the Safe Exam Browser – SEB?

- Secured web browser application
- for conducting online examinations
- using learning management systems and web-based quiz/e-assessment systems
- available for free, open source

What is Safe Exam Browser – SEB doing?

SEB prevents

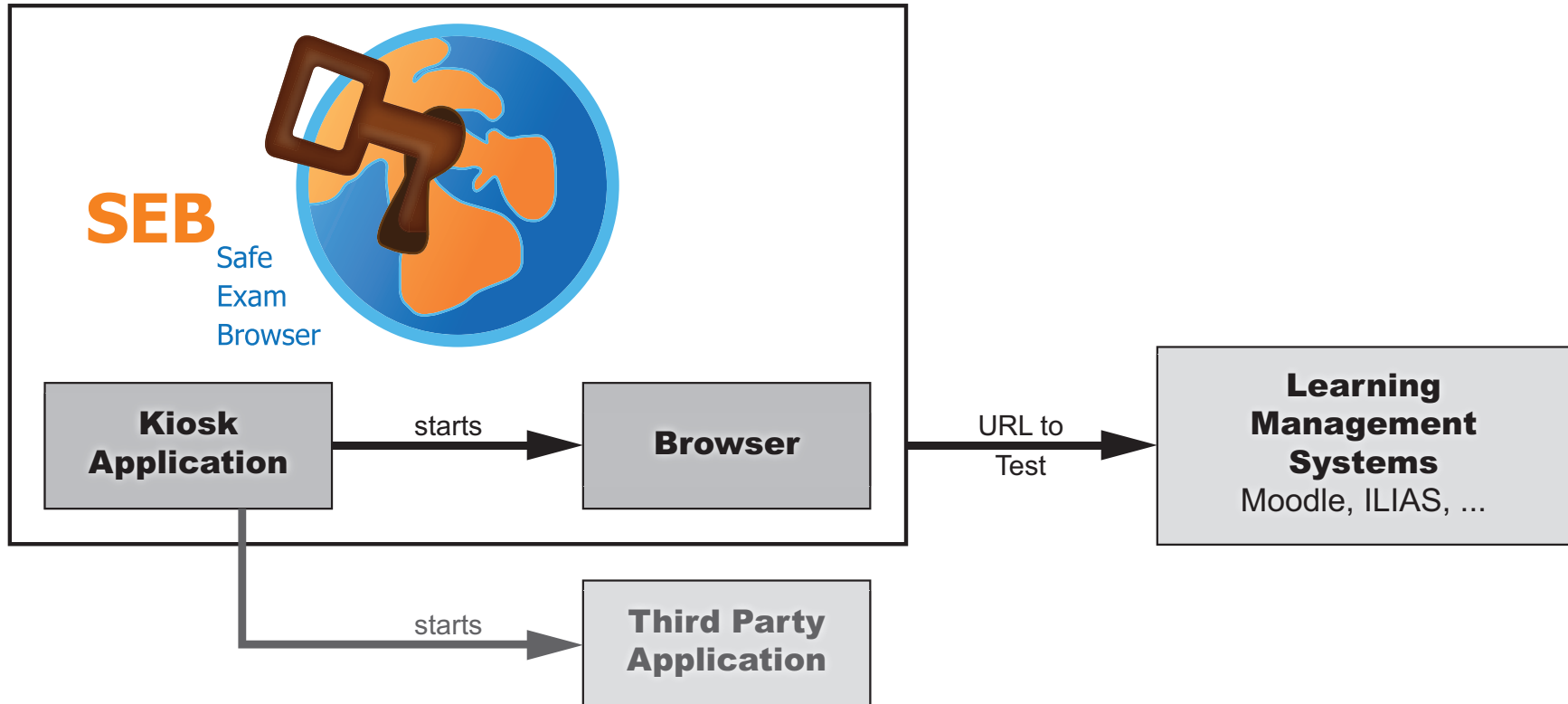
- opening any website
- switching to undesired applications
- operation system specific key combinations and functions
- quitting the secure browser during the exam

What is Safe Exam Browser – SEB doing?

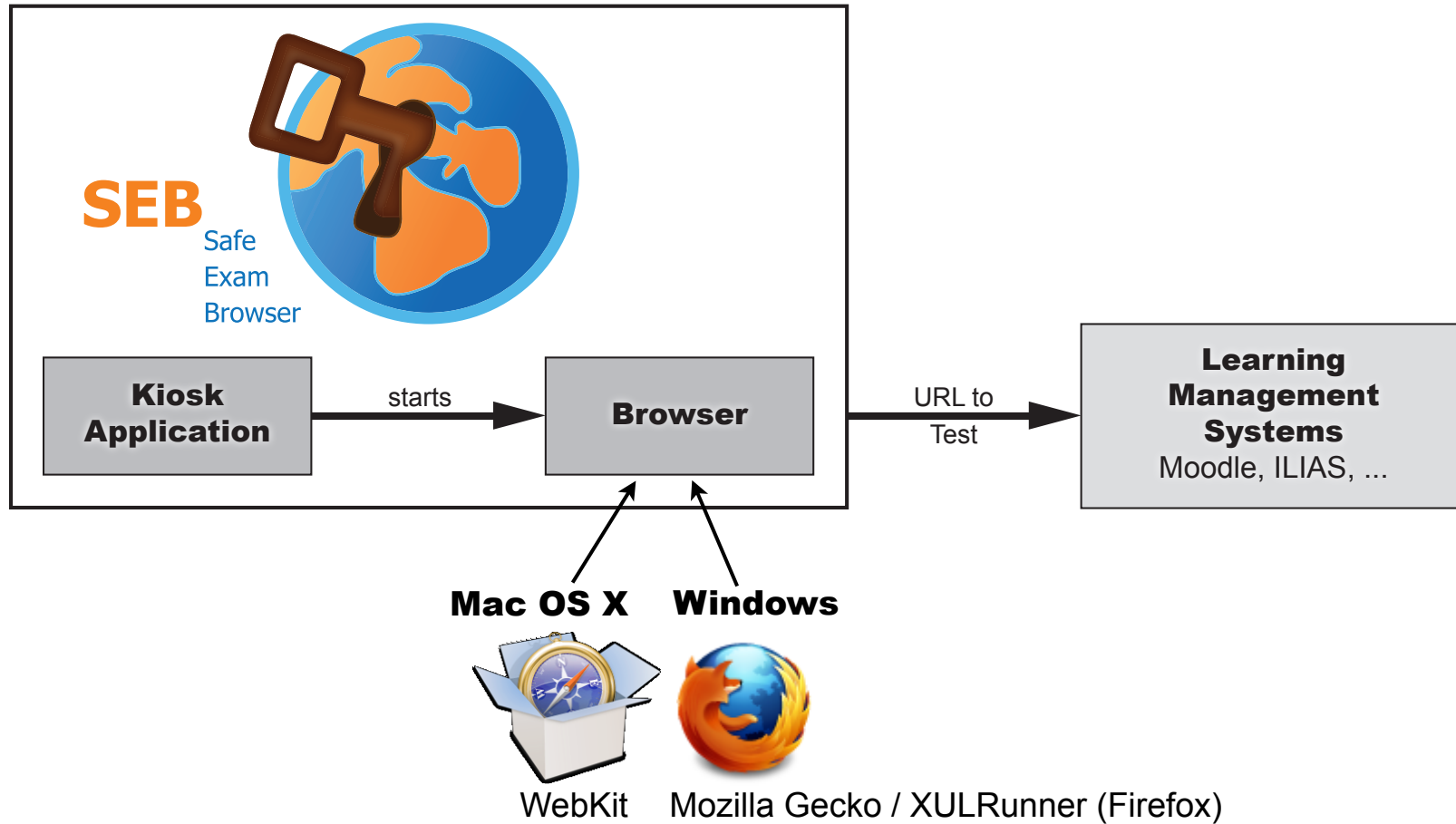
SEB allows

- connecting to web based learning management systems and web-based quiz/e-assessment systems
- use of selected third party applications during the examination

Architecture



The SEB-Browser



SEB's advantages

Application!



SEB's advantages: Application



- Easy to install
- No complex administration of exam computers necessary
- No special network configuration necessary in the exam room

SEB's advantages: Application vs. booting special OS

- Don't have to create, test and regularly update special boot images
- Very good compatibility with a wide range of hardware
- Windows and Mac OS X **third party applications** can be used in parallel with the exam

SEB 2.0 for Windows and Mac OS X

- Secure examinations on students' computers, BYOD
- Encrypted and signed individual configuration for each exam: **.seb configuration files**
- Easier deployment and initial configuration
- Securing integrity of the SEB application and settings used for an exam: **Browser Exam Key**
- Automated quitting of SEB after exam submission: **Quit Link**
- New unified (Mac/Windows) user interface (UI)
- New browser UI options
- **URL Filter**, open additional web resources

.seb Configuration Files

- SEB's configuration can be changed on-the-fly by opening another .seb file
 - > Individual configuration per exam
- Easier deployment and initial configuration
 - > Copying .ini or .plist settings files to system directories no longer necessary
- Encrypted and signed configuration files
 - > Cannot be altered/manipulated

Change configuration on-the-fly

- .seb is registered as SEB's file type
- If you double-click a .seb file, SEB is started and opens the .seb file
- When SEB opens the .seb file, it **changes its configuration** to the settings stored in this .seb file
- SEB “restarts” itself with the new settings, loads and displays the webpage at the new start URL

Easier deployment and initial configuration

- How to configure your exam clients after downloading and installing SEB?
- Before SEB 2.0 (SEB Windows):
 - ▶ Repack a new .zip file of the installer and the two customized configuration files SebStarter.ini and MsgHook.ini
 - ▶ Deploy the new .zip file and install on all exam client computers
- Not really a practical procedure on student computers
- Students could alter/manipulate the .ini files before installing SEB
 - > insecure on student computers

Easier deployment and initial configuration

- Configure your exam clients with SEB 2.0:
 - ▶ Create a .seb settings file with your desired configuration and save it with the option “**use for configuring clients**”
 - ▶ Send this .seb file to your students together with the download link for SEB 2.0

- Students install and configure SEB on their computers:
 - ▶ Students download SEB and install it
 - ▶ They double-click on the .seb settings file. SEB is started and configured

Easier deployment and initial configuration

- Deployment and configuration of SEB 2.0 on exam clients managed by the university's IT services:
 - ▶ Similar like in former versions: SEB is installed by a deployment system on all exam computers
 - ▶ Config file `SebStarter.seb` is copied into the directory

`C:\Users\<username>\AppData\Local\ETH_Zuerich\`
(Windows)

`/Users/<username>/Library/Preferences/`
(Mac OS X)

Two different use cases for .seb config files

Initial configuration of SEB clients vs. **starting exam**:

- **Initial configuration** changes settings of the installed SEB permanently (saved persistently on drive)
- Configuration for **starting an exam** changes settings only while the exam is running (saved temporary in memory)

How to use .seb config files for starting exam

- 1) Create a .seb settings file with your desired exam configuration and save it with the option
“use for starting an exam”

Use a password or a cryptographic identity to encrypt the .seb file.

How to use .seb config files for starting exam

2) Provide examinees with the .seb file for starting the exam:

- ▶ Upload the .seb file on a web server and put a link on the file on a simple HTML exam portal page
- ▶ Add the .seb file in your LMS as a resource that can be downloaded (to the course materials section or similar)
- ▶ Use a web content management system (CMS) to provide the .seb file on a exam portal page for download
- ▶ Put the .seb file on a network drive which gets mounted on all exam computers
- ▶ E-mail it to the students. This can make sense for trial exams which students can complete individually on their own computers.

Using an exam portal page:

Preparations for exam administrator

- Create a web page where you will put links to current exams
 - ▶ This web page can be a simple HTML page, you can use a CMS or the LMS for the portal page too
 - ▶ You can activate the exam link just before the exam and deactivate it afterwards

- Create a .seb file “*for configuring clients*” and use the address of the exam portal page as *Start URL* inside SEB.
 - ▶ You can configure SEB to be “insecure” while displaying the exam portal page: *Allow user to quit SEB* and don't use any *Quit Password*.
 - > If users start SEB accidentally, they will be able to quit it, their computer will not be locked.

Using an exam portal page: Preparations for exam administrator

- Create a .seb file “*for starting an exam*” for each exam and use the direct URL to the exam as Start URL in SEB
 - ▶ Configure SEB to be “secure” while displaying the exam;
 - ▶ Use a *Quit Password* and set a *Quit Link* (then examinees can quit SEB automatically, but only after submitting their exam);
 - ▶ don’t “*allow browsing back/forward*”;
 - ▶ allow using only the *third party applications* which are needed for the exam (if any);
 - ▶ use the “*send Browser Exam Key in HTTP header*” feature in SEB and the request header check in your LMS (if it supports it);
 - ▶ define URL Filter rules to allow accessing only the exam server;
 - ▶ and use all additional platform-specific security features of SEB which makes sense.

Using an exam portal page:

Preparations for students

- Send the .seb file “*for configuring clients*” containing the initial SEB configuration (together with the link where to download SEB) to the students
- Students download and install SEB on their machines, then double-click the .seb file, their SEB clients get configured to display the exam portal page
- This can be done once before the exam session starts and doesn't have to be repeated for every exam

Using an exam portal page: Start the exam

- **Exam administrator** activates the .seb file for starting the exam on the exam portal page.
- When all **students** have their computers ready, with SEB displaying the exam portal page, they can click the link and start the exam
 - ▶ If you used a password for encrypting the .seb file for the exam, students will only be able to enter the exam after you told them the password.
 - ▶ In this case students having access to the exam portal page cannot lock themselves into SEB accidentally without knowing the .seb exam password.

Encryption of .seb Configuration Files

Encryption using a **password**:

- Decrypting settings is not possible before password is communicated (just before exam starts)
- Best when using student computers

Encryption using a **cryptographic key** (identity):

- Decrypting settings is only possible if the key has been securely stored on the exam computer before the exam
- Best on managed computers
- No password has to be entered

Browser Exam Key

- Securing integrity of the SEB application and settings used for an exam
- The exam system can verify that a particular, unaltered SEB version and the correct exam settings are used for an examination
- Needs support/a plugin in the LMS/exam system. Such a plugin is already available for Moodle, support for ILIAS is announced

How to use the Browser Exam Key

- Configure SEB for your exam. In the *Exam* settings pane you have to activate the option “*Send Browser Exam Key in HTTP header*”
- Save your final exam settings in a .seb settings file
- In the *Exam* settings pane press the *Generate* button and copy the Browser Exam Key string to the according field in your quiz settings (in an exam system having support for SEB 2.0 built in)
- Use the saved .seb file for starting the exam

How to use the Browser Exam Key

- The Browser Exam Key depends on your SEB configuration and the SEB version (the application's code signature)
- Therefore, whenever you change any setting for an exam, you have to re-generate the Browser Exam Key and copy the new one into your quiz settings
- If several different versions of SEB are used for an exam (e.g. Windows and Mac clients), you have to generate a Browser Exam Key in each used SEB version and copy those two or more keys into the quiz settings

Browser Exam Key

Exam

General SEB Config Appearance Browser Down/Uploads Exam Applications Network Security

Browser Exam Key

28c1e9de3f73459fe617a34cac28eee1bb9a0e4e860948379b539109b731517a

Copy this key (which depends on your SEB configuration) to the according field in your quiz settings in the exam system having support for SEB 2.0 or later built in.

☐ Copy Browser Exam Key to clipboard when quitting SEB

☒ Send Browser Exam Key in HTTP header

Link to quit SEB after exam

<http://www.safeexambrowser.org/exit>

Place this quit link to the "feedback" page displayed after an exam was successfully finished. Clicking that link will quit SEB without having to enter the quit password.

Quit Link

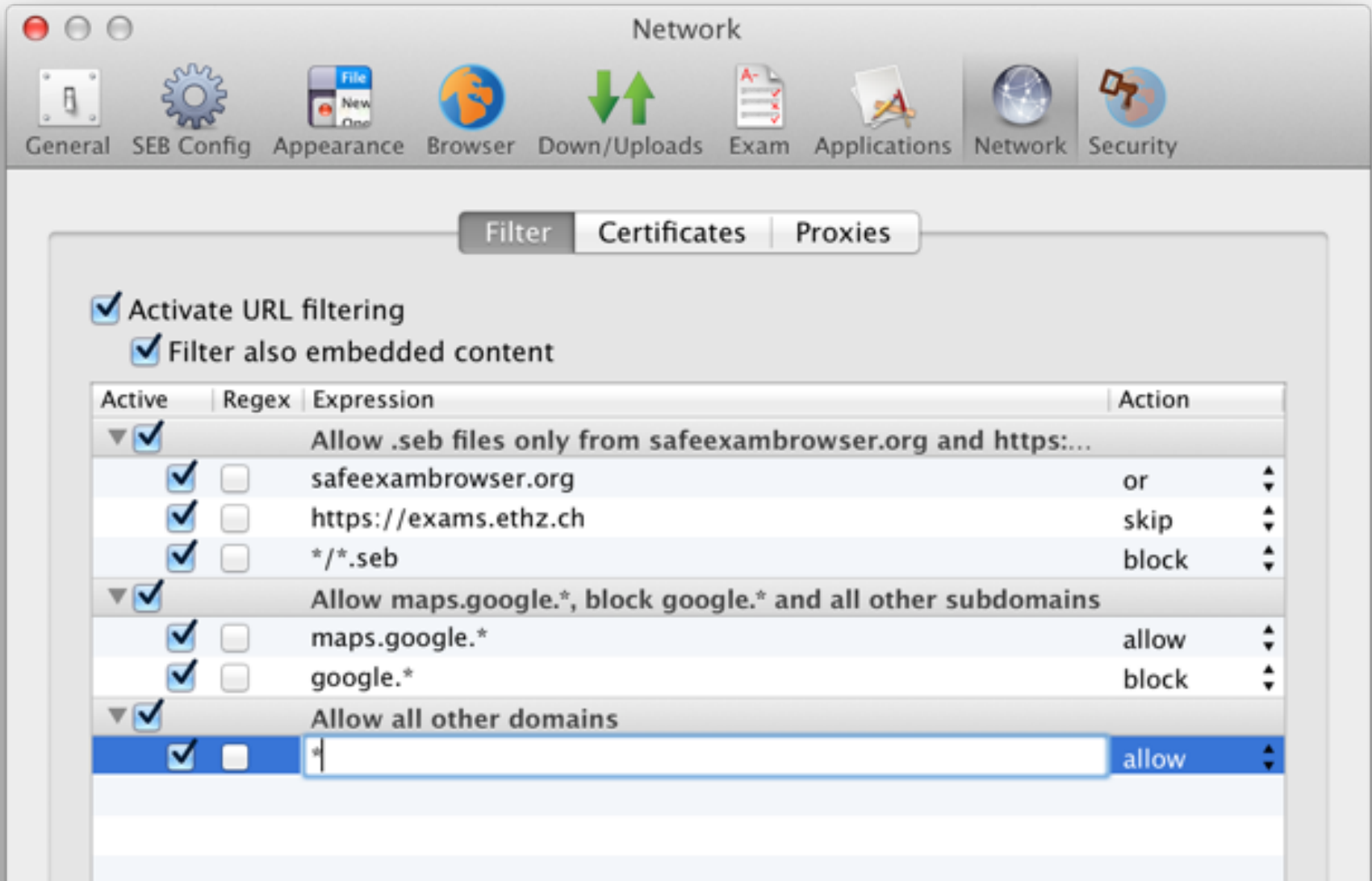
- Automated quitting of SEB after exam submission without having to enter a quit password or pressing a secret key combination
 - ▶ In the SEB exam settings define an arbitrary hyperlink in the *Quit Link* field
 - ▶ Put the same hyperlink on the feedback page (which is displayed after the exam has been submitted) in your exam system/quiz module
 - ▶ This works at least in Moodle and ILIAS (without LMS plugins) and will work with all other exam systems which allow to enter a feedback text containing html code/a hyperlink for a quiz

URL Filter

- With the URL filter you can prevent that specific websites, subdomains, directories or even single resources (like images) are displayed in the SEB browser.
- Thanks to the URL filter you can open some allowed resources in additional browser windows during the exam.

The filter prevents examinees to reach other pages than those which have been allowed.

URL Filter



Thank you!

More information and download at
www.safeexambrowser.org