



Safe Exam Browser A Modular Tool for Secure E-Assessments

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Introduction



What is Safe Exam Browser (SEB)

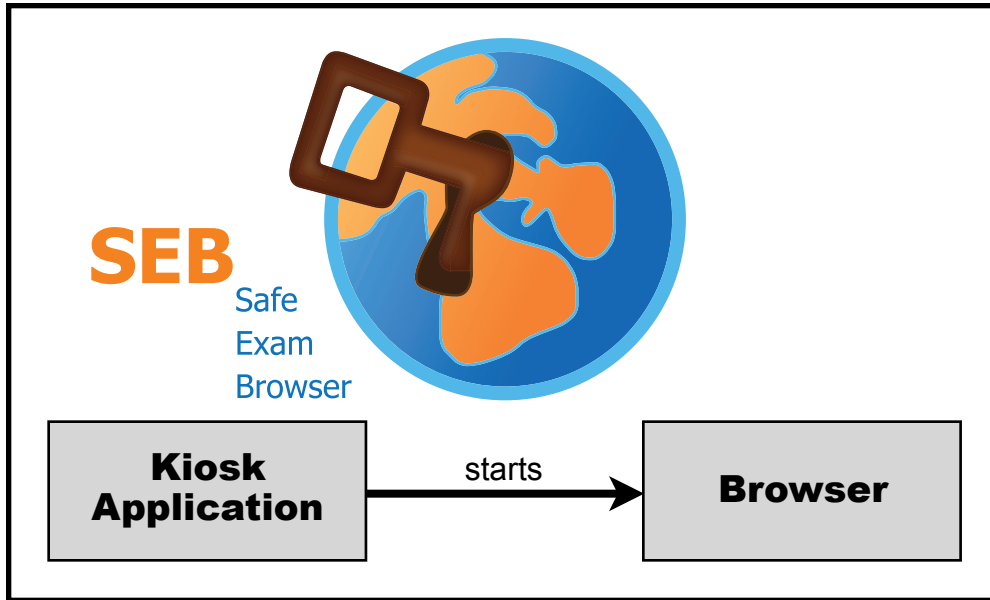
What is Safe Exam Browser (SEB)

- Secured web browser application
- For conducting exams on computers (Windows/Mac OS X) using web-based
 - exam systems
 - quiz modules of learning management systems
- Exams using third party applications

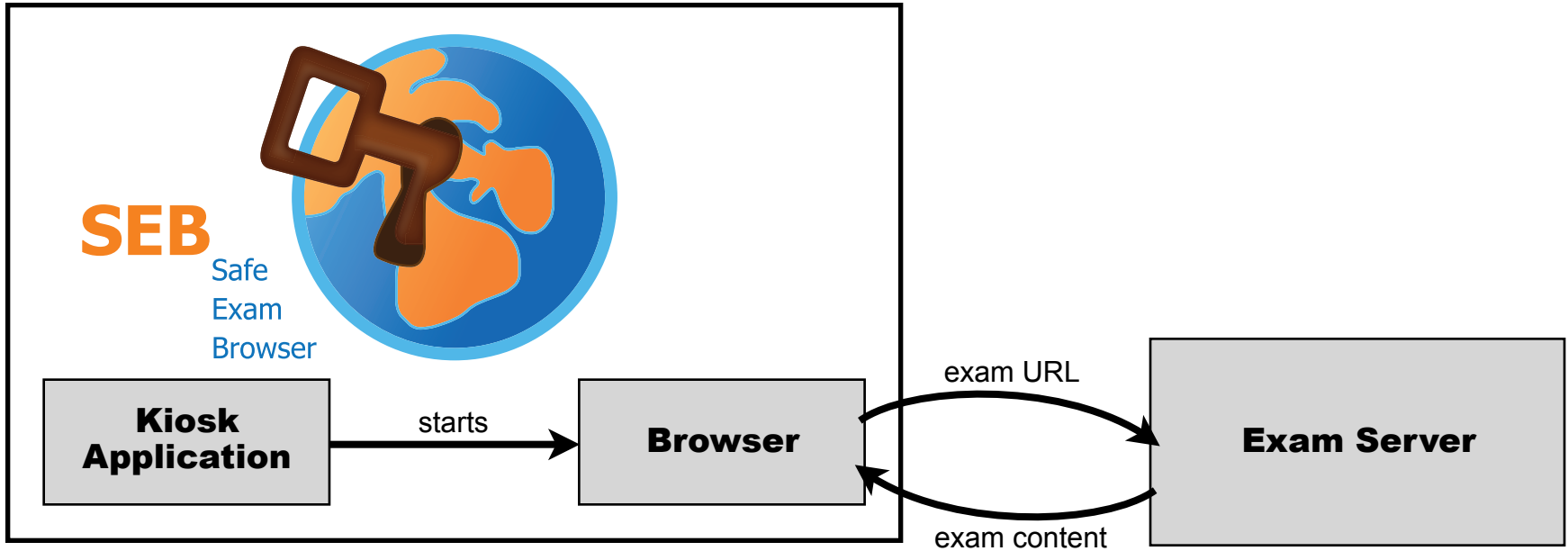
SEB: A Modular Tool for Secure E-Assessments



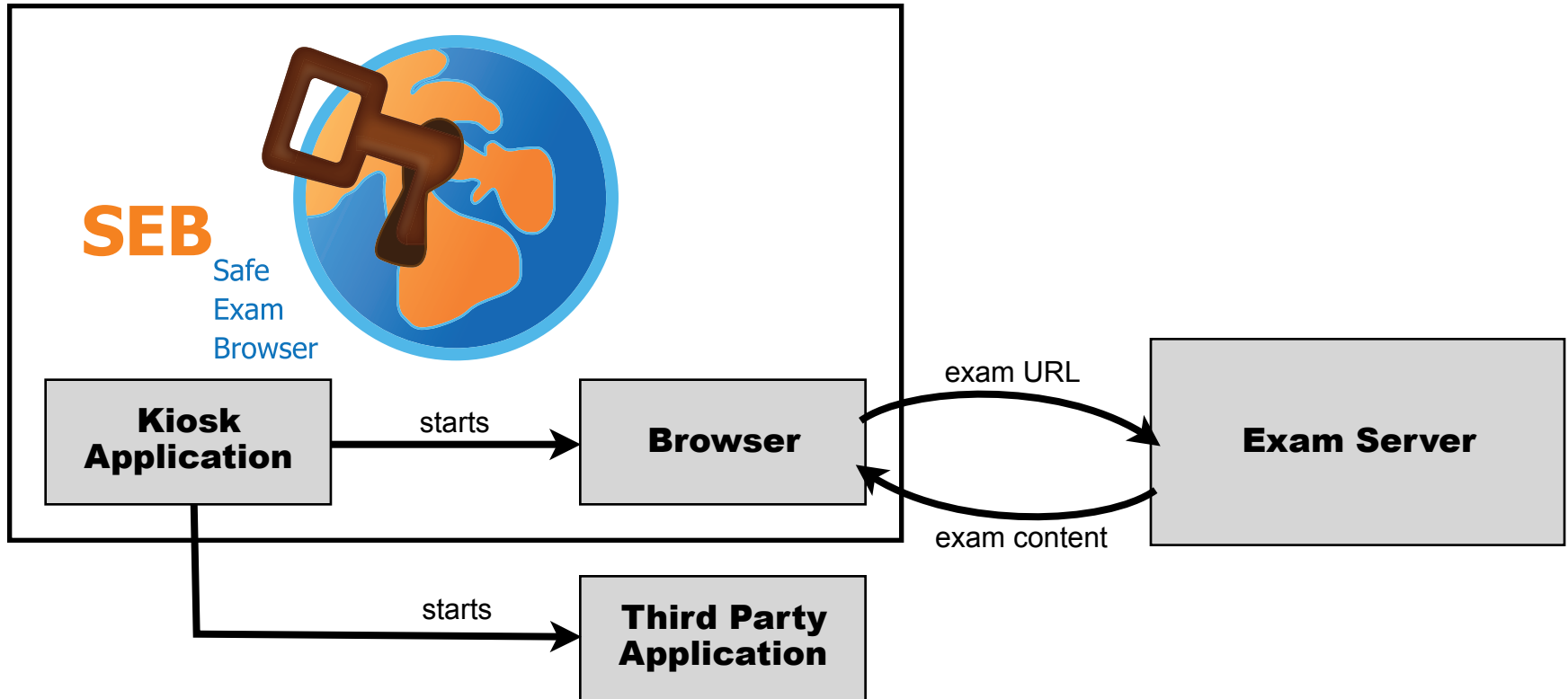
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- **Modular:** Third party applications, VDI, SEB Server
- **Free:** Open source, freeware, no centralized cloud service

History: Safe Exam Browser Project

- Idea by Stefan Schneider at University of Giessen, our Windows browser developer
- Developed since 2008 mainly at ETH Zurich
- Partly publicly funded (2010-2014) by national Swiss e-learning programs
- Open for community suggestions and contributions
- Global user base

Online Exams at ETH Zurich Swiss Federal Institute of Technology

- 2007 first pilots, 2010 regular service
- >50 exams with ~5'000 students in spring semester 2015
- Large percentage of selective, high-stakes examinations
- Summative exams designed by lecturers
- Important role of first year university exams in Switzerland



Safe Exam Browser – Future of the Project

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The options we examined in the last 7 months:

1. SEB Consortium
- ~~2. Spin-off company~~
3. Something small and inside ETH

In all cases SEB shall remain open source/freeware

SEB Consortium - Vision

- SEB is under the Mozilla Public License and freely available

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- SEB is under the Mozilla Public License and freely available
- Deliver, enhance and support SEB for organizations wishing to perform e-assessments

SEB Consortium - Tasks

- Foster the development of a flexible lockdown browser for educational and commercial use
- Provide financial and infrastructural support for at least two SEB-developers to allow ongoing development of SEB within the consortium
- Sustain and develop the existing community of interest for the SEB project
- Support the use and adoption of SEB software

SEB Consortium – Benefits & Membership Fees

Category	Membership Fee	Who should join?	Benefits
Principal Members	€ 50,000 US\$ 60,000	Educational Institutions, Companies	Prioritize SEB development goals, get direct, personal development support and consultancy by the SEB developers. Logo of institution/company is placed on consortium website
Gold Members	€ 10,000 US\$ 12,000	Educational Institutions, Companies	Suggest SEB development goals, build a feature list for SEB, Get direct, personal development support and consultancy by the SEB developers. Logo of institution/company is placed on consortium website
Silver Members	€ 5,000 US\$ 6,000	Educational Institutions, Small Companies, public authorities	Suggest SEB development goals, logo of institution/company is placed on consortium website
Bronze Members	€ 2,500 US\$ 3,000	Small Educational Institutions, Small Companies	Logo of institution or company is placed on consortium website

What's New in Safe Exam Browser



What's New: SEB 2.1 for Windows and Mac OS X

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- Touch optimized mode for Windows tablet computers
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- Process monitoring
- Individual proxy settings, URL filters and server certificates can be used per exam
- New settings for page and text zoom, disable spell check, browser user agent
- Re-engineered SEB Config Tool now allows comfortable editing and testing of SEB configuration files

Future Roadmap

- SEB 2.2
- SEB for iOS (iPad, iPhone, iPod Touch)
- New browser engine in SEB for Windows
- SEB Server

SEB 2.2

- Release for Windows, Mac OS X, iOS

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- Opening of permitted resources in additional browser windows, accessible via individual icons and popup menus placed in the SEB task bar (configurable per exam).

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- Opening of permitted resources in additional browser windows, accessible via individual icons and popup menus placed in the SEB task bar (configurable per exam).
- Improved handling of downloads, allows restricting access to particular file types, which may then be opened with associated permitted third party applications.
- Improved URL filter also in SEB for Windows
- New settings for language dictionaries (spell check)

SEB for iOS/iPad

- Works on managed iOS devices and with BYOD

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- Opening of permitted resources (HTML, PDF etc.) in additional browser tabs
- With embedded permitted resources offline exams are possible
- Built-in support for hand drawings
- Compatible configuration files/links
- Supporting most setting options of the SEB desktop versions

SEB Server

- Central management of SEB clients for exams:
Configuration of client settings for different exams in a web backend.

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- Central management of SEB clients for exams: Configuration of client settings for different exams in a web backend.
- Clients receive exam settings automatically from the SEB Server.
- Improved security with automatic three-way authentication between SEB clients, exam system and SEB Server which drastically eases configuration.
- Easy to operate remote supervising/proctoring functionality such as screen recording and logging of user activity without requiring third party software solutions.

SEB Server

Keeping the SEB exam solution modular and compatible with a wide range of exam systems

- Open source and freely available
- API to connect to exam system
- Installation on common open source servers
- Scalable: A centralized SEB Server for a large number of institutions will be possible

Links

- www.let.ethz.ch/pruefungen/onlinepruefungen/index_EN
- www.safeexambrowser.org

**Thank you for your attention.
Please discuss...**

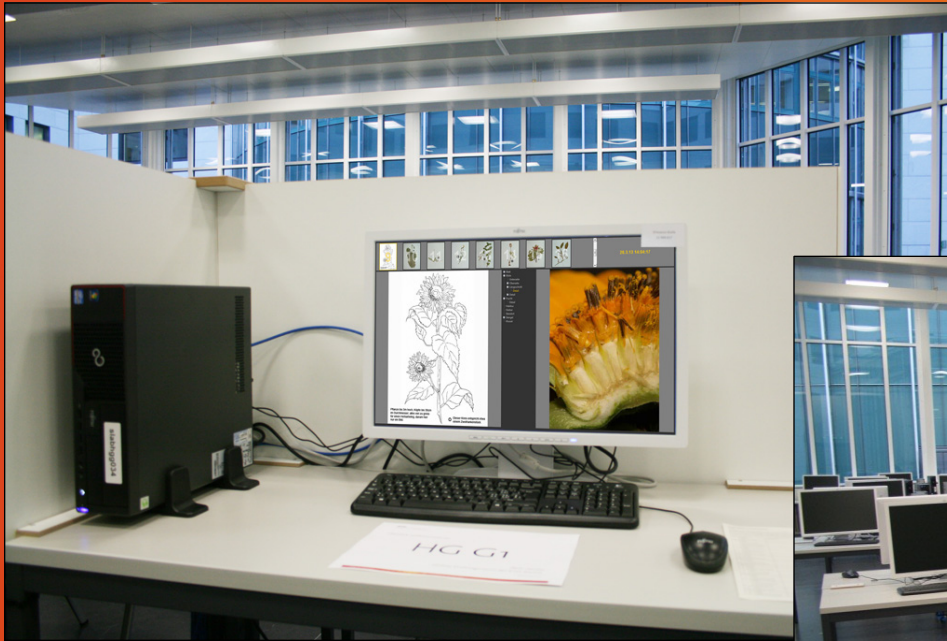
Daniel R. Schneider

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Using Virtual Desktop Infrastructure with SEB



Competency oriented exams using third party applications



Exam tasks today



learning



exam



application
/ competence

Example: Programming

```

13 - M = 10^5; % Number of Monte Carlo sample
14
15 - g1 = @(x) (x+0.25).^3; % integrand 1
16 - exact_g1 = (1.25^4-0.75^4)/4; % exact va
17
18 % Applying MC and antithetic MC
19 - [Smean1, Svar1] = MC(g1,2*M);
20 - [antiSmean1, antiSvar1] = MCantithetic(g
21
22 % parameter for 0.95-confidence interval
23 - beta = norminv(0.975, 0, 1);
24
25 % Output:
26 - fprintf('\nQuestion 5:\n\n')
27 - fprintf('Exact value = %.5f\n\n', exact_
28 - fprintf('standard Monte Carlo with M = %
29 - fprintf('Sample mean is: %.5f\n', Smean1)
30 - fprintf('Asympt. valid 0.95-confidence in
31 - Smean1 - beta*sqrt(Svar1/2/M), Smean1
  fprintf('length of asympt. valid 0.95-con
    2*beta*sqrt(Svar1/2/M))
  fprintf('antithetic Monte Carlo with M =
  fprintf('Sample mean is: %.5f\n', antiSmea
  fprintf('Asympt. valid 0.95-confidence in
    antiSmean1-beta*sqrt(antiSvar1/M), an
  fprintf('length of asympt. valid 0.95-con
    2*beta*sqrt(antiSvar1/M))
  end
end

function [Smean, Svar] = MC(g, M)
% This function computes a Monte Carlo app
% \int_{-1}^{1} g(x) dx with M samples.
% Input: g = function handle for the in
% M = number of Monte Carlo samp
% Output: Smean = sample mean
% Svar = sample variance

```

learning

function zahlenla
 % Dies ist ein Za
 % Ziel ist es ein
 % in möglichst wa
 zahl = randi(10)
 test = -1;
 while (test <= zahl)
 test = input('Ra
 versuche = versuche + 1
 if (test <= zahl)
 disp('Zu k
 elseif (test > zahl)
 disp('Zu g
 end

exam

```

16 - exact_g1 = (1.2
17
18 % Applying MC a
19 - [Smean1, Svar1]
20 - [antiSmean1, an
21
22 % parameter for
23 - beta = norminv(
24
25 % Output:
26 - fprintf('\nQues
27 - fprintf('Exact
28 - fprintf('standa
29 - fprintf('Sample
30 - fprintf('Asympt
31 - Smean1 - bet
  fprintf('length
    2*beta*sqrt
  fprintf('antith
  fprintf('Sample
  fprintf('Asympt
  antiSmean1-b
  fprintf('length
    2*beta*sqrt
  end
end

function [Smean,
% This function
% \int_{-1}^{1} g(x) dx
% Input: g =
% M =
% Output: Smean
% Svar

% initializing t
Smean = 0;
Svar = 0;
end

```

target competence

The goal: authentic, competence oriented exam tasks



learning



exam



application
/ competence

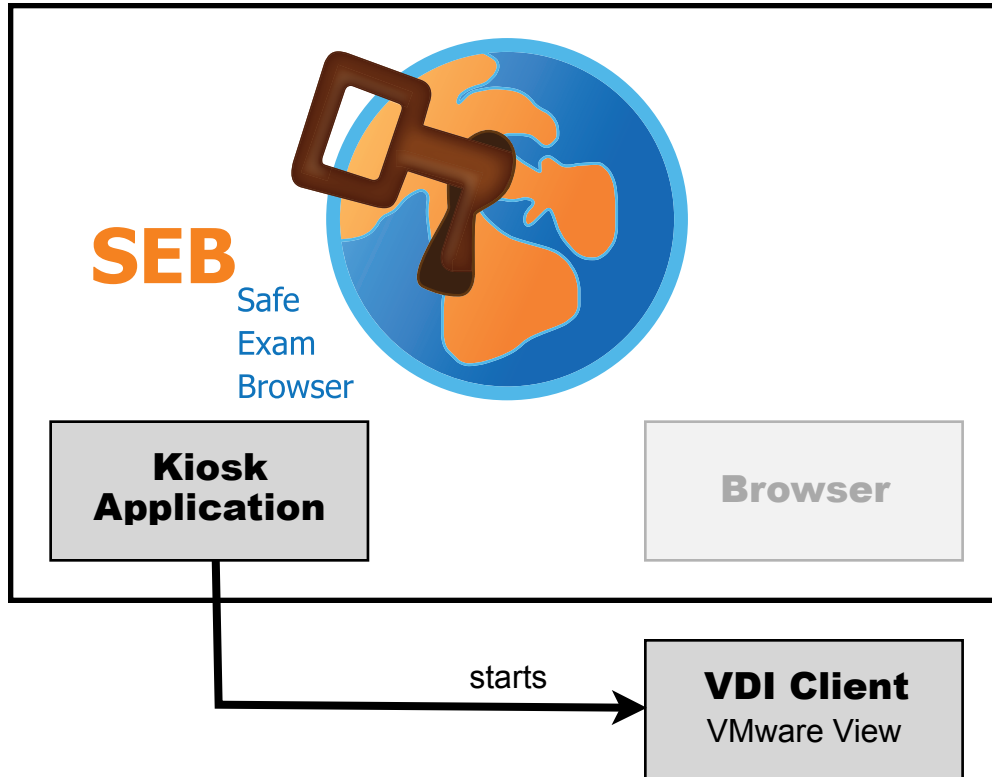
Technology: Requirements

- Secure, fraud-proof
- Reliable, robust
- Easy to use, familiar (for students)
- Easy to customize and manage (for administrators & examiners)

SEB with VDI

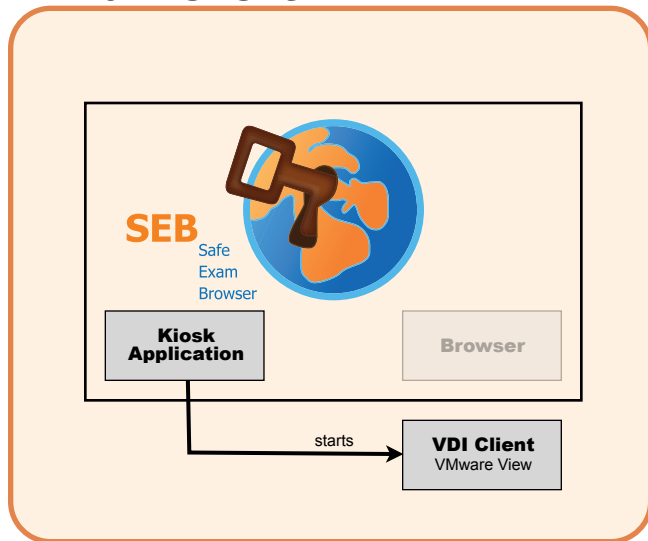


SEB with VDI



SEB with VDI

Exam Client



Individual Configuration

SEB with VDI

