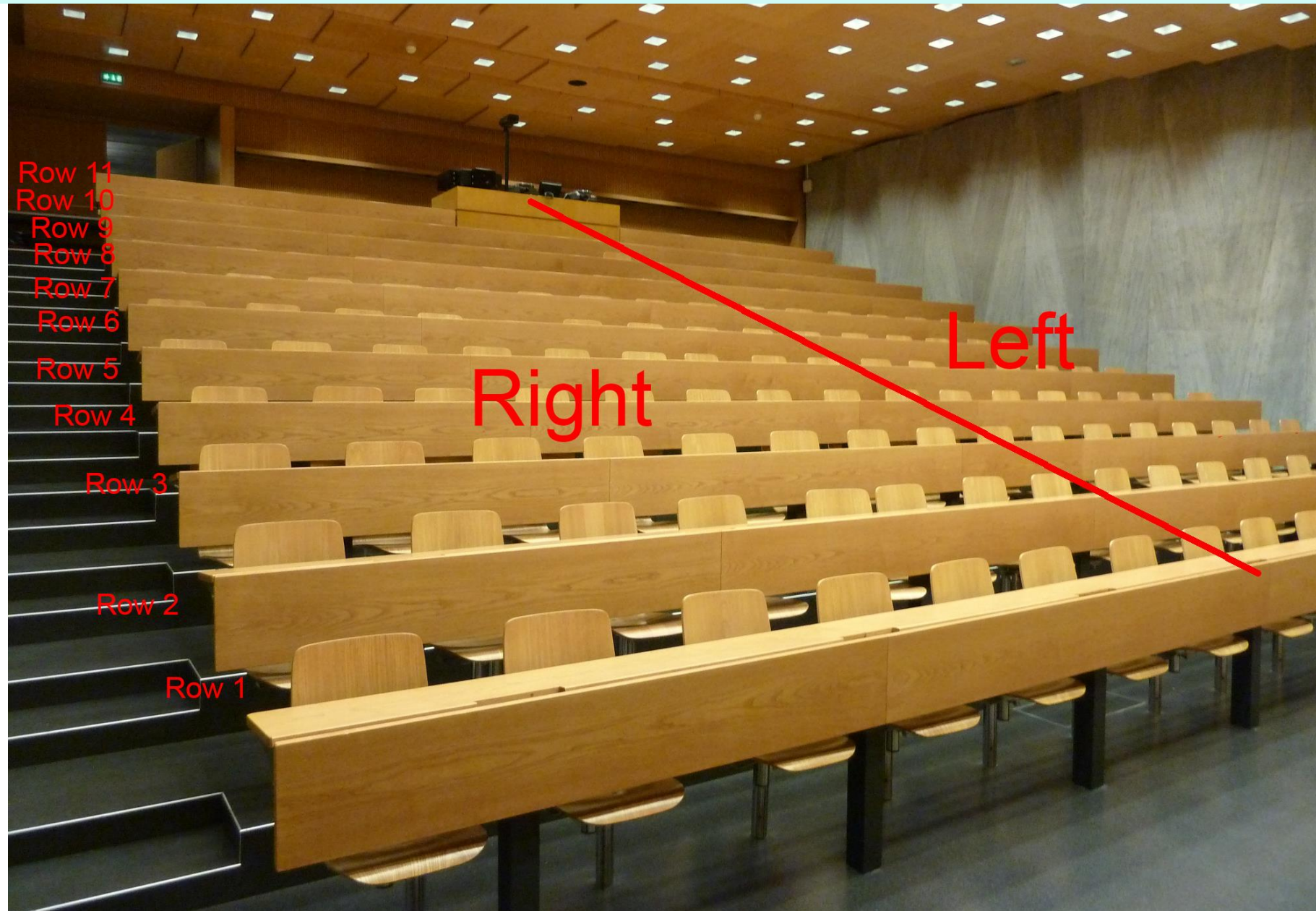


Seat nr:

4L (3)

Ignore

Left side of row 4



Network Security

Autumn Semester 2020

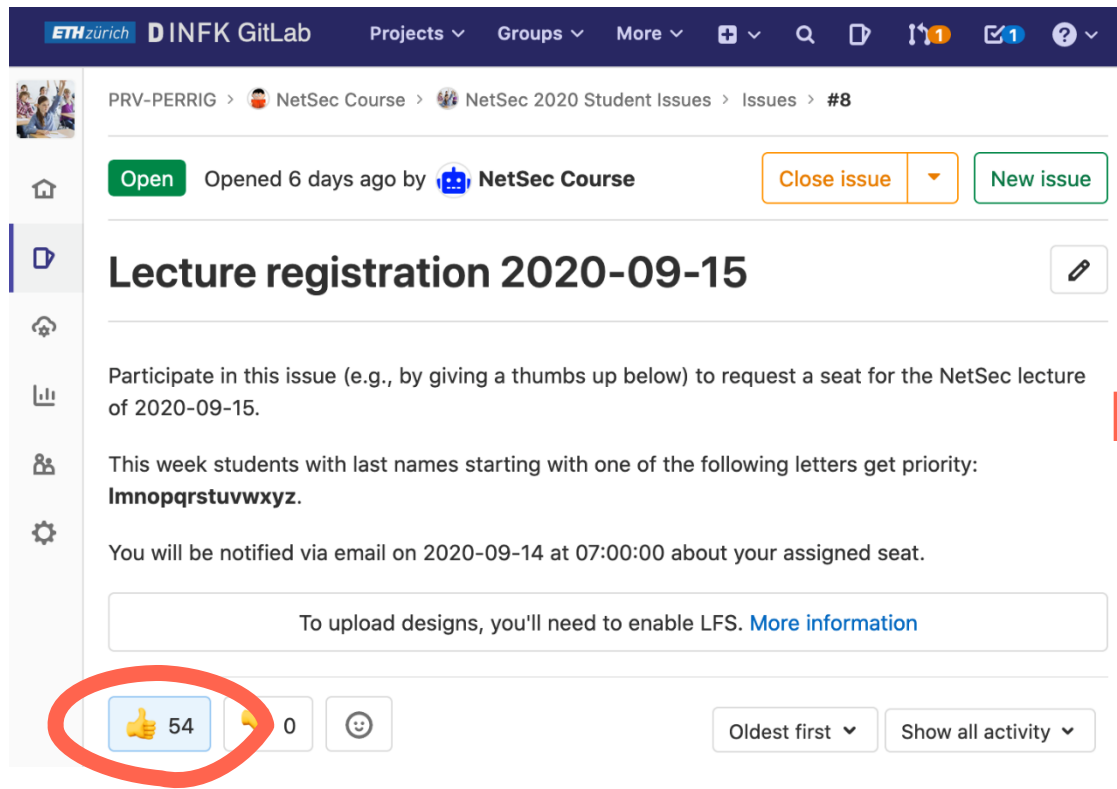
Introduction and Organization

15 September 2020

Prof. Dr. Adrian Perrig
Dr. Markus Legner
Dr. Stefan Frei

Lecture Tickets

In order to attend the lecture in person,
you must obtain a *lecture ticket* through GitLab



ETH zürich D INFK GitLab Projects Groups More + Search

PRV-PERRIG > NetSec Course > NetSec 2020 Student Issues > Issues > #8

Open Opened 6 days ago by NetSec Course **Close issue** **New issue**

Lecture registration 2020-09-15

Participate in this issue (e.g., by giving a thumbs up below) to request a seat for the NetSec lecture of 2020-09-15.

This week students with last names starting with one of the following letters get priority:
lmnopqrstuvwxyz.

You will be notified via email on 2020-09-14 at 07:00:00 about your assigned seat.

To upload designs, you'll need to enable LFS. [More information](#)

54 0

Oldest first Show all activity

[NetSec-seats] Seat 2L (1) assigned for 2020-08-18



NetSec Course <networksecurity@lists.inf.ethz.ch>

Mon 8/17, 7:00 AM

De Vaere Piet

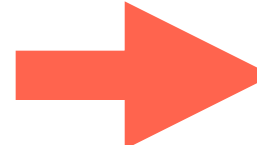
Reply all

Dear Piet

You have been assigned seat 2L (1) for the NetSec lecture of 2020-08-18.

Kind regards

The NetSec team



COVID-19 Measures

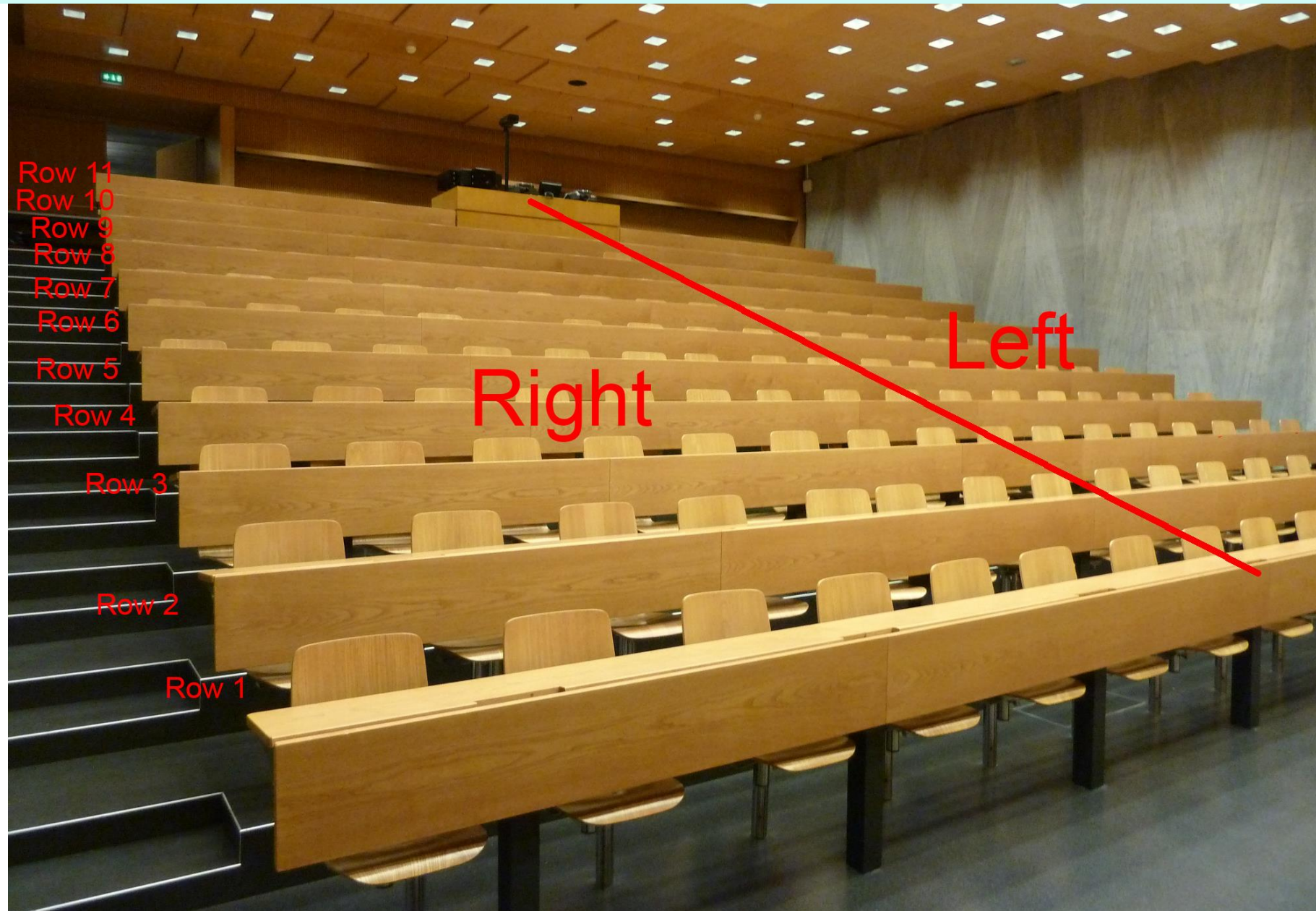
- Follow the general safety guidelines.
- **Always** wear a face mask over mouth and nose.
- **Do *not* attend the lecture if you have illness symptoms!**

Seat nr:

4L (3)

Ignore

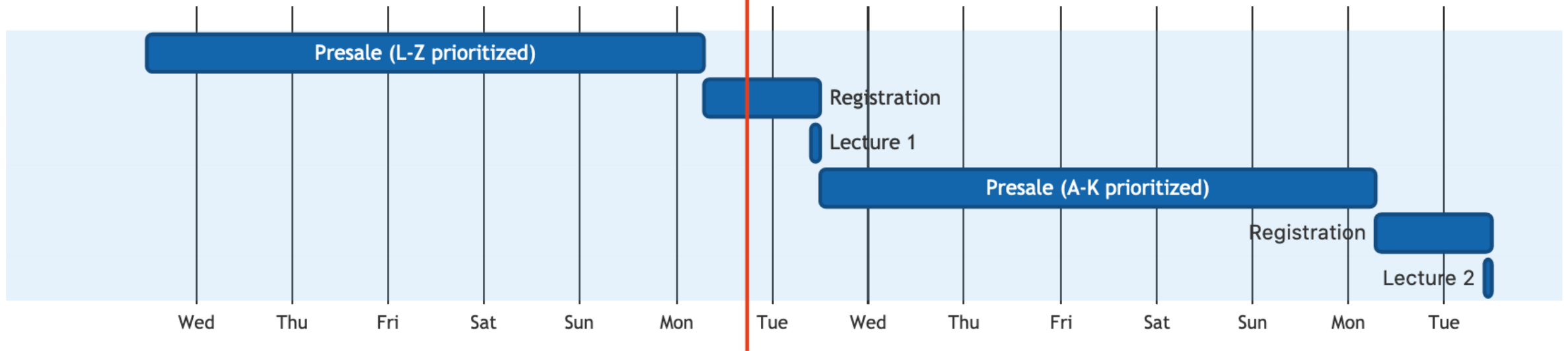
Left side of row 4



Lecture Tickets

Alternating prioritization ensures that you can visit at least every other lecture.

Lecture Registration Timeline



More information on GitLab (see later)

Network Security in the News

Hackers attacking US and European energy firms could sabotage power grids

The Register
Biting the hand that feeds IT

any Phone

DATA CENTRE SOFTWARE **SECURITY** DEVOPS BUSINESS PERSONAL TECH SCIENCE EMERGENT TECH BOOTNOTES VENDOR VOICE

{* SECURITY *

There are DDoS attacks, then there's this 809 million packet-per-second tsunami Akamai says it just caught

Bank on the receiving end of massive 418Gbps traffic barrage

Thu 25 Jun 2020 // 10:03 UTC

50 GOT TIPS?



Symantec reports the hacking group appears to be in information-gathering mode, but warns this could prelude an attempt at sabotage. Photograph: Gareth Fuller/PA

A hacking campaign is targeting the energy sector in [Europe](#) and the US to potentially sabotage national power grids, a cybersecurity firm has warned.

The group, dubbed “Dragonfly” by researchers at Symantec, has been in operation since at least 2011 but went dark in 2014 [after it was first exposed](#), secretly

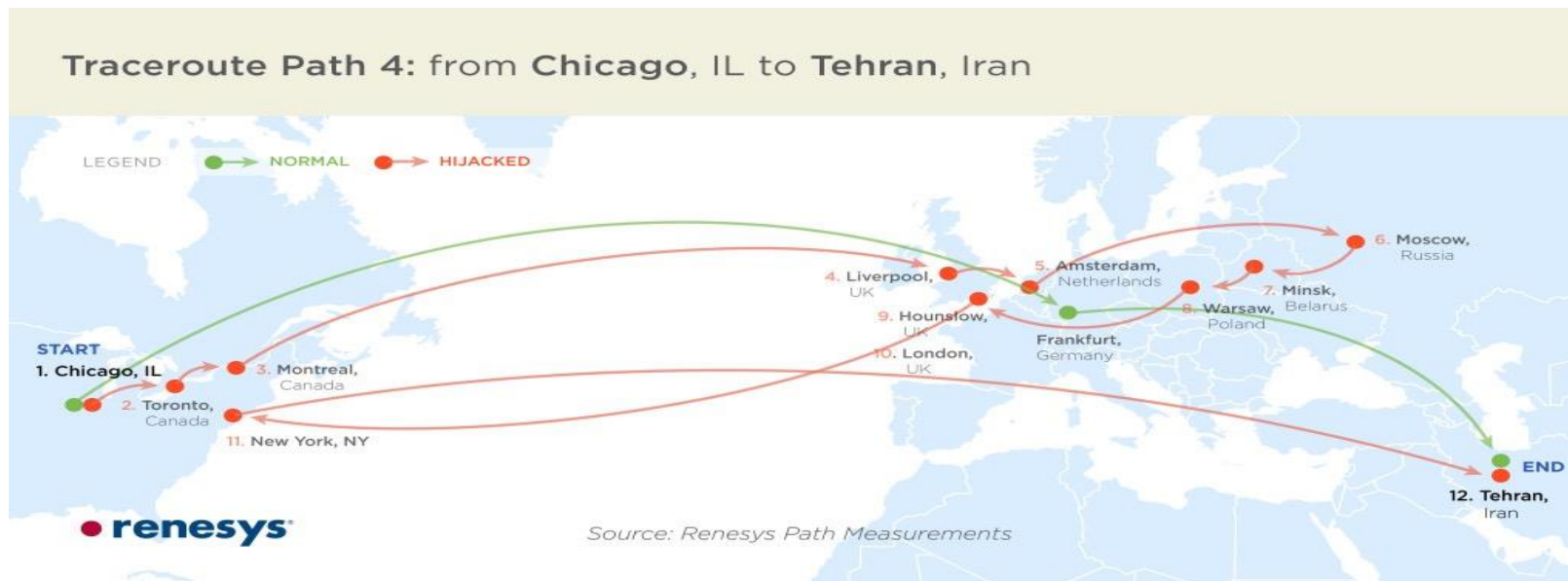
Victims Device

Cybersecurity researchers today revealed the existence of a new and previously undetected critical vulnerability in SIM cards that could allow remote attackers to compromise targeted mobile phones and spy on victims just by sending an SMS.

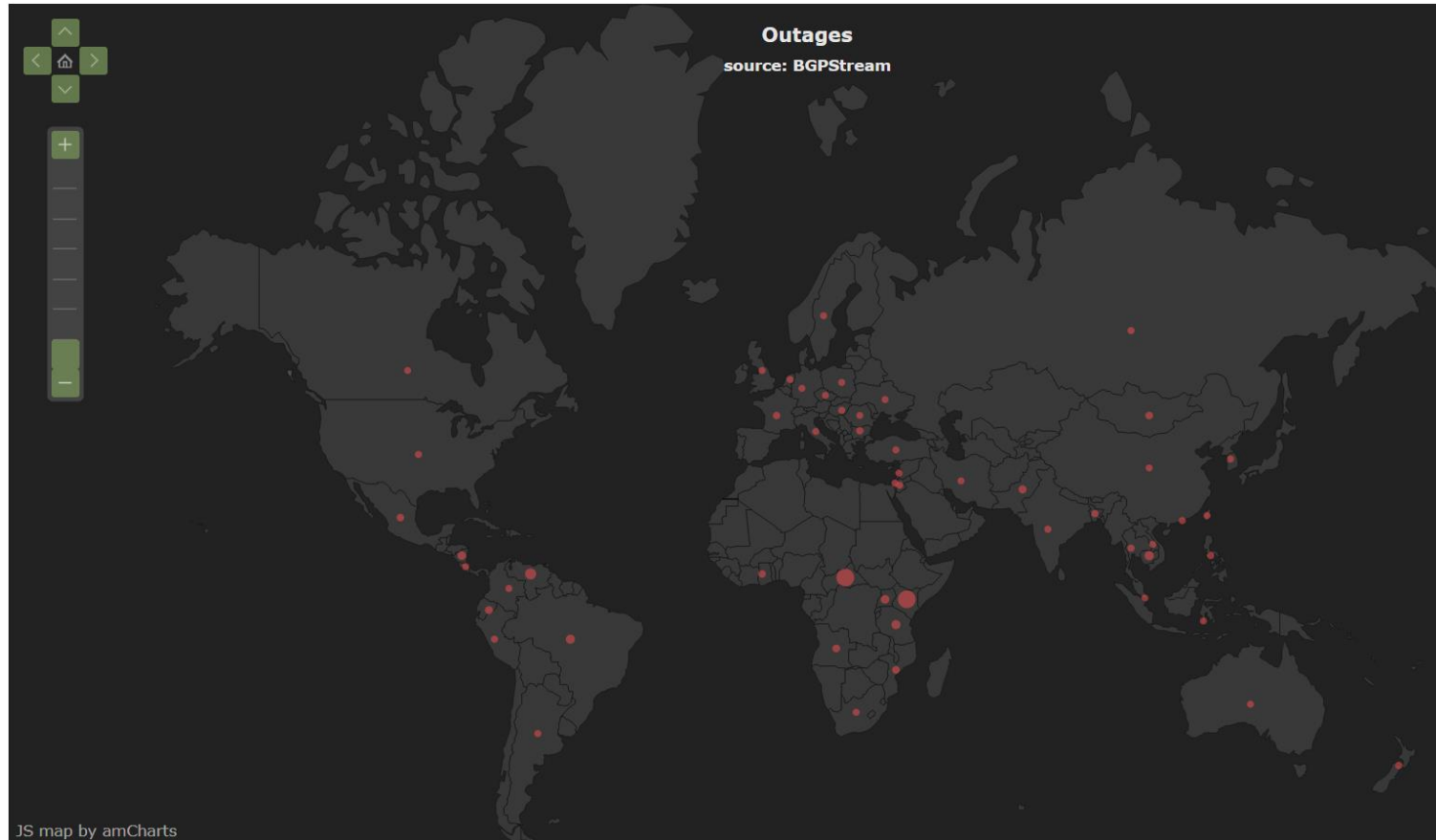
Dubbed “SimJacker,” the vulnerability resides in a particular piece of software, called the S@T

mplice vice

Daily Internet Attack: BGP Prefix Hijacking



Attack Monitor: bgpstream.com



Event type	Country	ASN	Start time (UTC)	End time (UTC)
Possible Hijack		Expected Origin AS: COGENT-174, US (AS 174) Detected Origin AS: EAGLENET, LB (AS 60372)	2020-09-14 20:42:41	
Possible Hijack		Expected Origin AS: COGENT-174, US (AS 174) Detected Origin AS: EAGLENET, LB (AS 60372)	2020-09-14 20:42:41	
Possible Hijack		Expected Origin AS: IPMEN, GB (AS 209372) Detected Origin AS: RU-FIXED-KRSK, RU (AS 57129)	2020-09-14 19:47:29	
Outage		VALLEY-COMMUNICATIONS, US (AS 394972)	2020-09-14 19:41:00	2020-09-14 19:44:00
Possible Hijack		Expected Origin AS: SIGNET-AS, NL (AS 28878) Detected Origin AS: COLT Technology Services Group, SE (AS 15404)	2020-09-14 19:34:52	
Possible Hijack		Expected Origin AS: SIGNET-AS, NL (AS 28878) Detected Origin AS: COLT Technology Services Group, SE (AS 15404)	2020-09-14 19:34:52	
Outage		INFOSTROY-AS INFOSTROY AS, RU (AS 208397)	2020-09-14 16:48:00	2020-09-14 16:55:00
Outage		INFOSTROY-AS INFOSTROY AS, RU (AS 208397)	2020-09-14 16:33:00	2020-09-14 16:36:00
Possible Hijack		Expected Origin AS: JOSE MARIA DELPINO(TELMIX), PY (AS 269763) Detected Origin AS: (AS 269764)	2020-09-14 16:22:20	
Possible Hijack		Expected Origin AS: GROUPNET, IQ (AS 209699) Detected Origin AS: ALSARD, IQ (AS 39216)	2020-09-14 15:29:59	
Possible Hijack		Expected Origin AS: FORCEPOINT-CLOUD-AS, EU (AS 44444) Detected Origin AS: ASN-ORANGE-ROMANIA, RO (AS 8953)	2020-09-14 15:07:56	
Possible Hijack		Expected Origin AS: SMPHI-AS-AP SM Prime Holdings, Inc., PH (AS 58884) Detected Origin AS: SMIC-AS-AP SM Investments Corporation, PH (AS 141016)	2020-09-14 14:56:46	
Outage		Global Conect Ltda, BR (AS 262735)	2020-09-14 13:56:00	
Possible Hijack		Expected Origin AS: ASSKYNET, LB (AS 48418) Detected Origin AS: Beirut-Lebanon, LB (AS 9051)	2020-09-14 13:50:41	
Possible Hijack		Expected Origin AS: ALTIMA-TELECOM, CA (AS 22423) Detected Origin AS: SPRINTLINK, US (AS 1239)	2020-09-14 12:11:04	
Possible Hijack		Expected Origin AS: ALEXHOST_SRL, MD (AS 207636) Detected Origin AS: SPRINTLINK, US (AS 1239)	2020-09-14 12:11:04	
Outage		INFOSTROY-AS INFOSTROY AS, RU (AS 208397)	2020-09-14 12:04:00	2020-09-14 12:10:00
Outage		COOPERATIVAS DE CALAMUCHITA - CONSORCIO DE COOPERACION, AR (AS 263230)	2020-09-14 11:55:00	2020-09-14 11:58:00
Outage		INFOSTROY-AS INFOSTROY AS, RU (AS 208397)	2020-09-14 11:54:00	2020-09-14 11:58:00
Outage	KI	N/A	2020-09-14 09:42:00	
Outage		BENCHMARK-AS-IN Benchmark Infotech Services Pvt.Ltd., IN (AS 58966)	2020-09-14 09:34:00	2020-09-14 09:37:00
Outage		KINGS-AS-ID Kings Network Indonesia, PT, ID (AS 45725)	2020-09-14 06:51:00	
Possible Hijack		Expected Origin AS: ESINNET Shenzhen ESIN Technology Co., Ltd, CN (AS 59072) Detected Origin AS: ULAN-NETWORK-LIMITED Ulan Network Limited, HK (AS 134196)	2020-09-14 01:40:00	
Outage		COFRACTAL-001, US (AS 26073)	2020-09-14 01:24:00	2020-09-14 01:31:00

Network Components are Also Vulnerable

Hackers Infect Over 100,000 IoT Devices with Crypto Mining Malware

August 02, 2018 Mohit Kumar

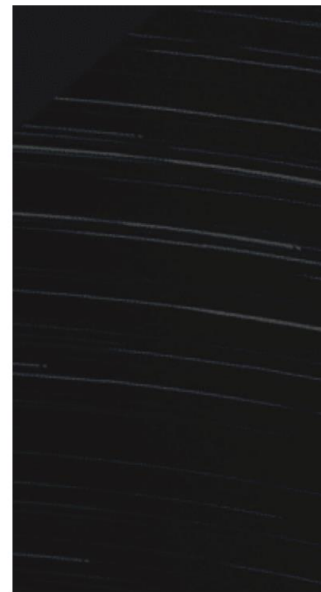


Security researchers have discovered that hackers have infected thousands of unpatched MikroTik routers connected to them.

In all, the malware campaigns have infected over 100,000 IoT devices across hardware provider Mikrotik across

Thousands of MikroTik Routers Compromised by Hackers on Network Traffic

September 03, 2018 Swati Khandelwal



Last month we reported about hackers exploiting vulnerabilities in MikroTik routers using a previously unknown exploit.

Now Chinese security researchers have discovered more vulnerable MikroTik routers, maliciously, allowing attackers to

TELECOMS TAKE NOTE —

Attackers are trying to exploit a high-severity zeroday in Cisco gear

Exploits can exhaust memory in hardware used by telecoms and cloud providers.

DAN GOODIN - 8/31/2020, 9:59 PM

Some Passwords Exposed

September 03, 2018



What could






Cybersecu

vulnerabili

—that involve insecure storage of credentials, potentially affecting every user and system on that






Example: Ethereum Wallet Heist


THE VERGE TECH SCIENCE CULTURE CARS REVIEWS LONGFORM VIDEO MORE     

TECH CYBERSECURITY ENTERPRISE

Hackers emptied Ethereum wallets by breaking the basic infrastructure of the internet 21


By Russell Brandom | @russellbrandom | Apr 24, 2018, 1:40pm EDT







   SHARE






Hijack of Amazon CloudFront service used for 12 hours unnoticed

Between 11am until 1:11pm, a hacker hijacked the Amazon CloudFront service, routing you to a website controlled by an unknown actor.

**XCEL**
A BLOCKCHAIN UTILITY TOKEN
BUY NOW *Invest at your own risk, there is no guarantee for future success. **TOKEN SALE NOW OPEN**

 363     7 

 David Floyd  
🕒 Apr 24, 2018 at 16:35 UTC | Updated Apr 24, 2018 at 16:37 UTC **NEWS**



Users of MyEtherWallet, a web app for storing and sending ether and ethereum-based tokens, experienced an attack Tuesday that saw users of the service lose around \$152,000 worth of ether.

MyEtherWallet is a commercial cloud provider who count major websites such as Twitter.com as customers.

About This Course

- The course will cover topics spanning four broad themes:
 - Network **defense mechanisms** such as secure routing protocols, TLS, anonymous communication systems, network intrusion detection systems, and public-key infrastructures;
 - Network **attacks** such as denial of service (DoS) and distributed denial-of-service (DDoS) attacks;
 - Attack **analysis and inference** topics such as network forensics and attack economics;
 - Secure **next-generation network architectures**.
- We will assume knowledge of the “Computer Networks” course taught in the spring semester (<https://ndal.ethz.ch/courses/networks.html>)
 - “Networking Refresher” in exercise session this week
 - More pointers during the course
 - No specific questions in exam, but may be required to answer other questions

Draft Syllabus

AP	Course introduction, crypto refresher
AP	PKI systems
KP	TLS
KP	TLS
ML	VPNs, IPsec, Wireguard
ML	Anonymous-communication systems
ML	BGP security, BGPsec, best practices
ML	(D)DoS attacks and current defense mechanisms
SF	DNS security and privacy
SF	Firewalls, IDS, evasion and limitations
SF	Cybersecurity in practice / legal aspects
AP	Probabilistic traffic-monitoring techniques
AP	Next-generation Internet (SCION)
AP	Next-generation PKIs + DRKey

Learning Objectives

- You are familiar with fundamental **network-security concepts**.
- You can **assess current threats** that Internet services and networked devices face and can evaluate appropriate countermeasures.
- You can **identify and assess known vulnerabilities** in a software system that is connected to the Internet (through analysis and penetration testing tools).
- You have an in-depth understanding of a range of important **security technologies**.
- And: You develop some **intuition** and reasonable **paranoia** in your work with ICT.

Lecturers



Prof. Dr. Adrian Perrig, Twitter @adrianperrig

- Since 2013, Professor of Computer Science, ETH Zürich
- 2002-2012: Professor at Carnegie Mellon University
- Core focus: network and systems security, secure communication architectures



Dr. Stefan Frei, Twitter @stefan_frei

- Senior Security Principal, Accenture Cyber Defense
- PhD ETH Zurich
- Formerly VP Research NSS Labs, Austin/TX, USA, Research Director Secunia
- Penetration Tester/Researcher ISS X-Force (now part of IBM)



Dr. Markus Legner,

- Postdoctoral Researcher, Network Security Group
- PhD ETH Zurich (in theoretical physics)
- Working on further improving data-plane security and quality of service for SCION



Prof. Dr. Kenny Paterson, Twitter @kennyog

- Since 2019, Professor of Computer Science, ETH Zürich
- Until 2019: Professor at University of London
- Core focus: applied cryptography, many contributions to TLS

Lecture and Exercise Sessions

Lecture:

Tue 10:00-12:00, CHN C 14

- Key security concepts, theory, technologies, case studies
- Schedule and topics at <https://www.netsec.ethz.ch/courses/netsec-2020/>

Exercise session and guest talks:

Thu 16:00-18:00, HG F 1

- “Attack show cases”, discussion of assignments, guest talks

Teaching assistants

- Piet De Vaere, Head TA
- Giacomo Giuliari, Exercise TA
- Simon Scherrer, Project TA

Student assistants

- Tommaso Ciussani
- Marc-Philippe Bartholomä
- Ben Fiedler, DtF project



Exercise Sessions

- Will take place on Thursday 16:15–18:00 in HG F 1
- Sessions will consist of:
 - 1 hour discussion of last exercise sheet
 - 1 hour of one of the following:
 - Guest lecture
 - Project discussion
 - Question hour
- First exercise session is this Thursday (17.09.2020)
 - By exception this exercise session will contain a “Networking Refresher” lecture

Guest Lectures

We will again have exiting guest lectures this year

- Nico Schottelius, **Ungleich**, “Security Aspects of IPv6”
- Maxim Salomon, **Google**, “Security vulnerabilities of modern Wireless LAN Systems”
- Rayhaan Jaufeerally, **AS210036**, “An exploration of real-world network security”
- Candid Wüest, **Acronis**, “Malware Analysis and Prevention”
- Patrick Schmid, **RedGuard**, “Top X Ways to get Domain Admin”
- David Mc Laughlin, **ETH Zürich**, “Email spam prevention at ETH”

Course Webpage

The course's webpage is at:

<https://netsec.ethz.ch/courses/netsec-2020/>

Course materials (slides, exercises, ...) will be distributed through a GitLab repository linked to on this page. Course registration is required for access.

Lecture recordings will be distributed through the ETH video portal.

GitLab

The screenshot shows the GitLab web interface. At the top is a dark blue header with the ETH Zürich logo, 'D INFK GitLab', and navigation links for Projects, Groups, and More. A search bar is on the right. The left sidebar contains a 'NetSec Course' section with a user icon, and links for Subgroup overview, Details (selected), Activity, Issues (2), Merge Requests (0), and Members. The main content area shows the 'NetSec Course' group details, including its name, lock icon, Group ID (6769), and description 'Network Security MSc course'. Below this is a section for 'Subgroups and projects' with tabs for Shared projects and Archived projects. A search bar and a 'Last created' dropdown are present. Two projects are listed: 'NetSec 2020 Student Resources' (Reporter, 2 stars, 4 hours ago) and 'NetSec 2020 Student Issues' (Guest, 2 stars, 1 week ago).

ETH Zürich D INFK GitLab Projects Groups More

Search or jump to...

NetSec Course

Subgroup overview

Details

Activity

Issues 2

Merge Requests 0

Members

PRV-PERRIG > NetSec Course > Details

NetSec Course Group ID: 6769

Network Security MSc course

Subgroups and projects Shared projects Archived projects

Search by name Last created

NetSec 2020 Student Resources Reporter 2 stars 4 hours ago

Student resources for the Fall 2020 Network Security Course

NetSec 2020 Student Issues Guest 2 stars 1 week ago

Student issues for the Fall 2020 Network Security Course

We use the D-INFK GitLab instance: <https://gitlab.inf.ethz.ch>

GitLab Resources

The screenshot shows the GitLab web interface for the 'NetSec 2020 Student Resources' project. The top navigation bar includes the ETH Zürich logo, the project name, and various navigation links. The left sidebar contains a 'Project overview' section with links to 'Details', 'Activity', and 'Releases', as well as a 'Repository' section with links to 'Operations', 'Analytics', and 'Members'. The main content area displays the project details, including the project ID (10911), a 'Leave project' link, and statistics (15 Commits, 1 Branch, 0 Tags, 13.9 MB Files, 13.9 MB Storage). Below this, there is a section for the 'master' branch, showing the 'removed .dir placeholder' commit by Piet De Vaere. A table lists the project's files and their last commit details. The 'README.md' file is expanded, showing the 'Network Security (NetSec) 2020 User Manual' content.

NetSec 2020 Student Resources

Project ID: 10911 | [Leave project](#)

15 Commits | 1 Branch | 0 Tags | 13.9 MB Files | 13.9 MB Storage

Student resources for the Fall 2020 Network Security Course

master | netsec-2020-resources | History | Find file | Clone

removed .dir placeholder
Piet De Vaere authored 7 minutes ago | b8660c93

README | No license. All rights reserved

Name	Last commit	Last update
exercises	removed .dir placeholder	7 minutes ago
lectures	created directories for lecture slides and exercises	2 weeks ago
old_exams	added old exams	2 weeks ago
README.md	swapped odd and even name based prioritization for lecture tick...	1 day ago
chn_c_14_annotated.jpg	actually adding new smaller picture	2 weeks ago

README.md

Network Security (NetSec) 2020 User Manual

Welcome to the NetSec course! For this course, GitLab will serve as the main point of (online) interaction between students and the course team. Concretely, using this GitLab you will

- receive lecture materials such as slides, exercises, and old exams:

Slides

Exercises

Old Exams

Project Descriptions

...

GitLab Issues

We will use the GitLab issue tracker extensively in this course:

- Lecture registration
- Questions about lecture, exercises, projects
- Administrative questions
- Handing in exercises
- ...

PRV-PERRIG > NetSec Course > NetSec 2019 Students > Issues > #75

Closed Opened 7 months ago by [redacted] [Report abuse](#)


Difference between EPIC Level 2 and PISKES

I don't really understand what the difference between EPIC and PISKES is. EPIC Level 2 achieves source authentication using DRKey (Slide 20) and PISKES, according to slide 24, does the same. It seems like they are just the same thing? Or what makes them different?


To upload designs, you'll need to enable LFS. [More information](#)

👍 0 👎 0 Oldest first ▾ Show all activity ▾

[redacted] added **Exam** label 7 months ago

**Markus Legner** @mlegner · 7 months ago Developer ⋮

The core difference is that PISKES provides source authentication to the destination host (and thus does not require any router support) while EPIC L2 enables router support for all intermediate routers (in addition to the destination).

 [redacted] · 7 months ago Reporter ⋮

Oh, got it! Thank you :)

[redacted] closed 7 months ago

Private questions through GitLab

PRV-PERRIG >  NetSec Course >  NetSec 2020 Student Issues > Issues > New

New Issue

Title

Super private question

Description

Write Preview

B *I* “ ” </>     

I do not want other students to see this

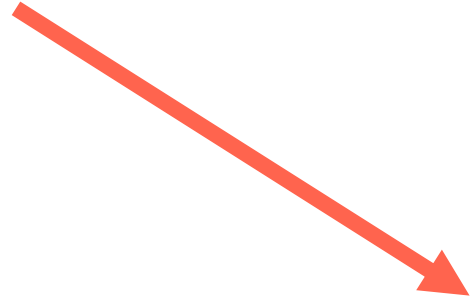
Markdown and quick actions are supported

 [Attach a file](#)

☒ This issue is confidential and should only be visible to team members with at least Reporter access.

Submit issue

Cancel



Handing in Exercises through GitLab

PRV-PERRIG >  NetSec Course >  NetSec 2020 Student Issues > Issues > **New**

New Issue

Title

[exercise-hand-in] Exercise 1

Description

Write Preview

Preview

B *I* ” </>

Exercise sheet 1: Crypto and Networks refresher

Crypto refresher

Question 1

Concisely answer the following questions:

Question 1.1 (2 points)

Edward wants to prove to Laura he really is the sender of a message. What security property is he trying to achieve? Which cryptographic primitive could he use?

```
**Solution**: He could do a rain dance
```

Markdown and quick actions are supported

 [Attach a file](#)

☒ This issue is confidential and should only be visible to team members with at least Reporter access.

[Submit issue](#)

Cancel

Email

**Please use GitLab issues whenever possible
and **do not send us email.****

Using issues allows for discussion, better tracking of questions, and more transparency!

Hacking Lab

- Students can autonomously solve challenges on hacking lab.
- Solving the challenges is NOT mandatory and does NOT influence the final grade. Solving the challenges will provide some practical experience and may help with the exam.
- Hacking Lab will be explained more in detail in an exercise session.

Projects

- There will be two projects
- The projects are mandatory and individual
- 20 % of the final grade will be determined by the projects
- Each project has an equal weight

- ACME Project:
 - Implement an Automatic Certificate Management Environment (ACME) client

- Defend-the-Flag Project:
 - Diagnose and patch a vulnerable server

- More information will follow in the exercise session.

Exam in January/February

- **Time:** Written exam, 120 minutes
- **Language:** Q: English, A: German or English (your choice)
- **Exam materials:** No extra materials are permitted
- **Exam coverage:**
 - Lectures, guest talks, exercises, projects
- **What and how we assess:**
 - We cover most (if not all) course topics
 - Understanding of security concepts, techniques and attacks as well as the ability to suggest appropriate defense measures
- **The exam will probably take place on computers**

Grading

- **Exam:** 80 % of grade
- **Projects:** 20 % of grade
 - The two projects are weighted equally.
 - Not handing in a projects results in a 1 *for that project*.
 - ➔ Not handing in the projects results in a maximum score of 5.00 for the course.

Action Items for Network Security Students

- **Lecture registration** (“Einschreibung”)
 - Subscribe to “Network Security HS 2020” on <http://www.mystudies.ethz.ch/>

Legal use of NetSec material

- Some knowledge, technologies, code usable for attacks, it is illegal to use them for criminal activities
- It is also illegal to make available such technologies and code without proper measures
- Only myStudies-registered students have access to the course materials