DUGN 2023

PLAY AGAINST

VULNERABILITY

WITH

APEX

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Lino Schildenfeld

Equip
<IT • management • consulting>

Oracle ACE Pro

Mirela Ardelean

@Mirela_RoOUG

RO OUG
Romanian Oracle User Group

SYM42

MASH

EOUC

@LinoSchilde

Oracle ACE Pro

AUSOUG

fabe
reduce • rescue • reconnect

AOP

APEX R&D
research & development

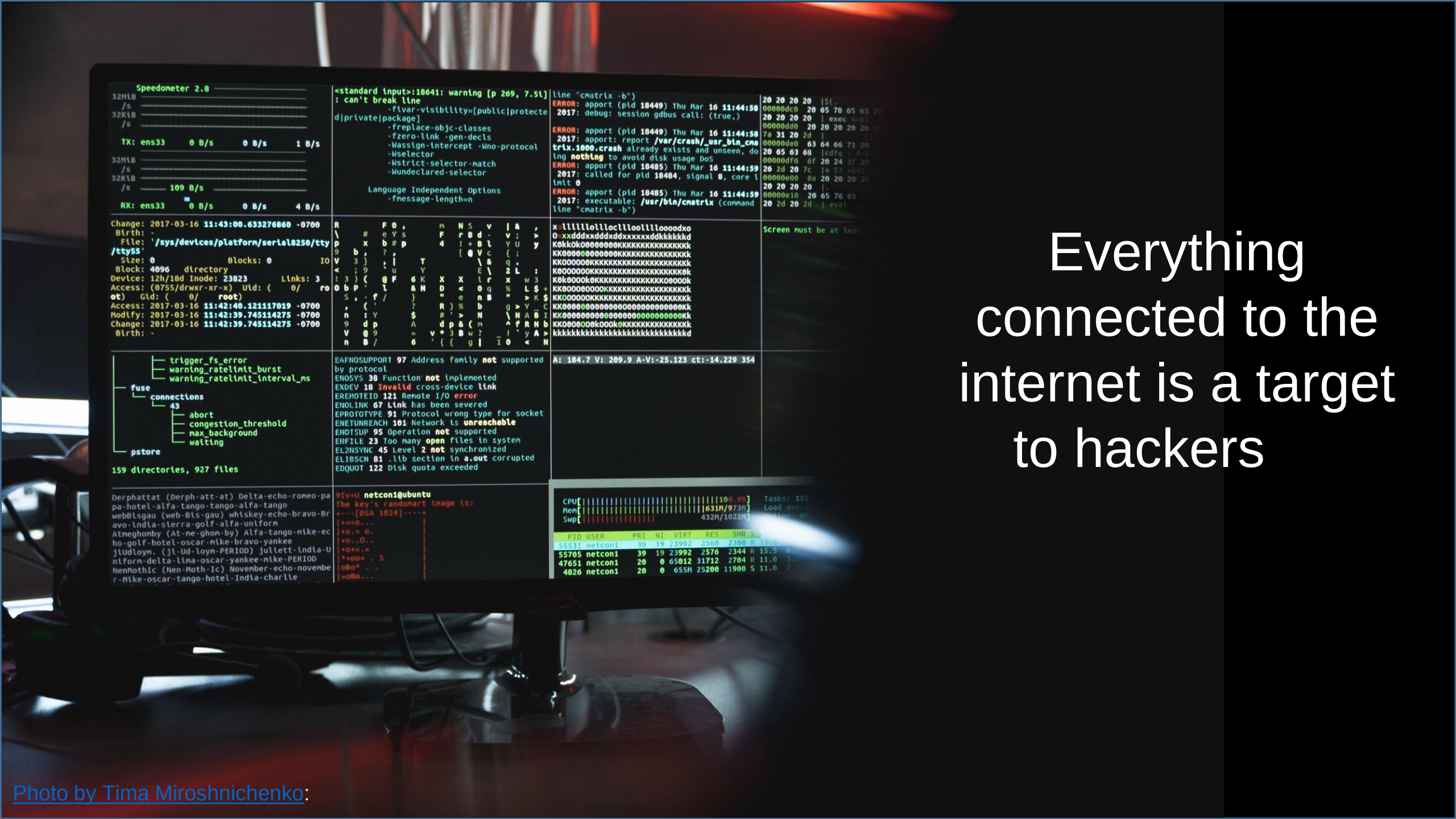
- AUSOUG APEX committee chair
- NZ APEX meetup organizer
- Blogger
- Conference speaker
- APEX World Member of the Month
- Mentor and trainer

Mentor and Speaker Hub

Our goal is to *connect* speakers with mentors to assist in *preparing* technical sessions and *improving* presentation skills

Interested? Read more and get in touch

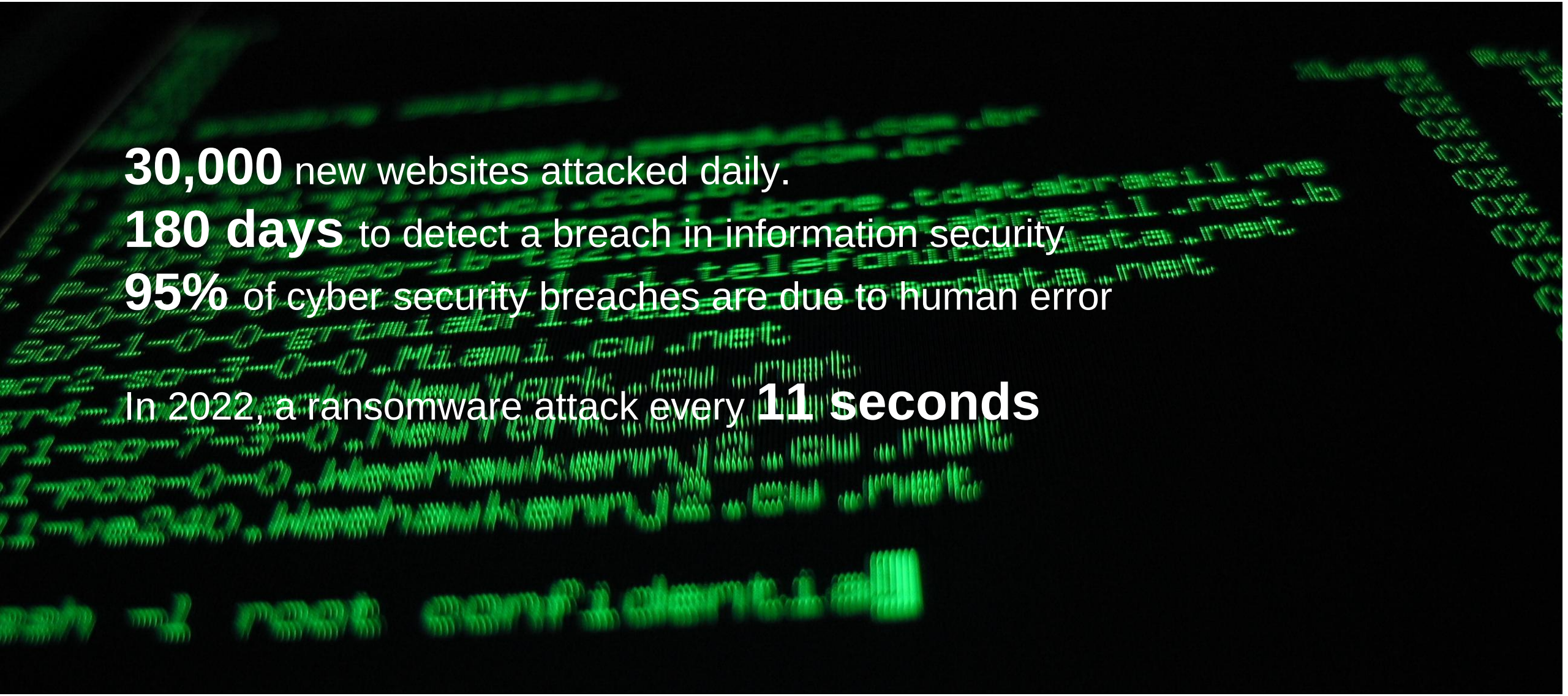
https://mashprogram.wordpress.com



Everything connected to the internet is a target to hackers

Photo by Tima Miroshnichenko:

seconds



source: https://techjury.net/blog/how-many-cyber-attacks-per-day/#gref

Hacked Russian Taxi App Orders Dozens of Cabs to the Same Address, Chaos Ensues

The resulting frenzy reportedly caused hours of traffic delays.

BY PETER HOLDERITH SEP 2, 2022 3:23 PM

NEWS

CYBERCRIMINALS HACK COSTA RICA AND PERU, THREATEN LATIN AMERICAN GOVERNMENTS

17 May, 2022 Valentina Global

The international criminal organization Conti -based in Russia-, which specializes in extracting sensitive data from government agencies and attacking public platforms, is said to be behind the cyber-attacks suffered by the governments of Costa Rica and Peru, which have both countries on high alert.

source: https://bh-compliance.com/cybercriminals-hack-costa-rica-and-peru-threaten-latin-american-governments/

data leaks - one of the primary causes of data breaches

Data Leaks are usually caused by internal errors

A data breach is the intended outcome of a planned cyberattack

UpGuard

Causes of Data Leak

Social Engineering

Misconfigured Software Settings

Recycled Passwords

Physical Theft of Sensitive Devices

Use of Default Passwords

Software Vulnerabilities

ā'pěks

(#orclapex)

is

SAFE

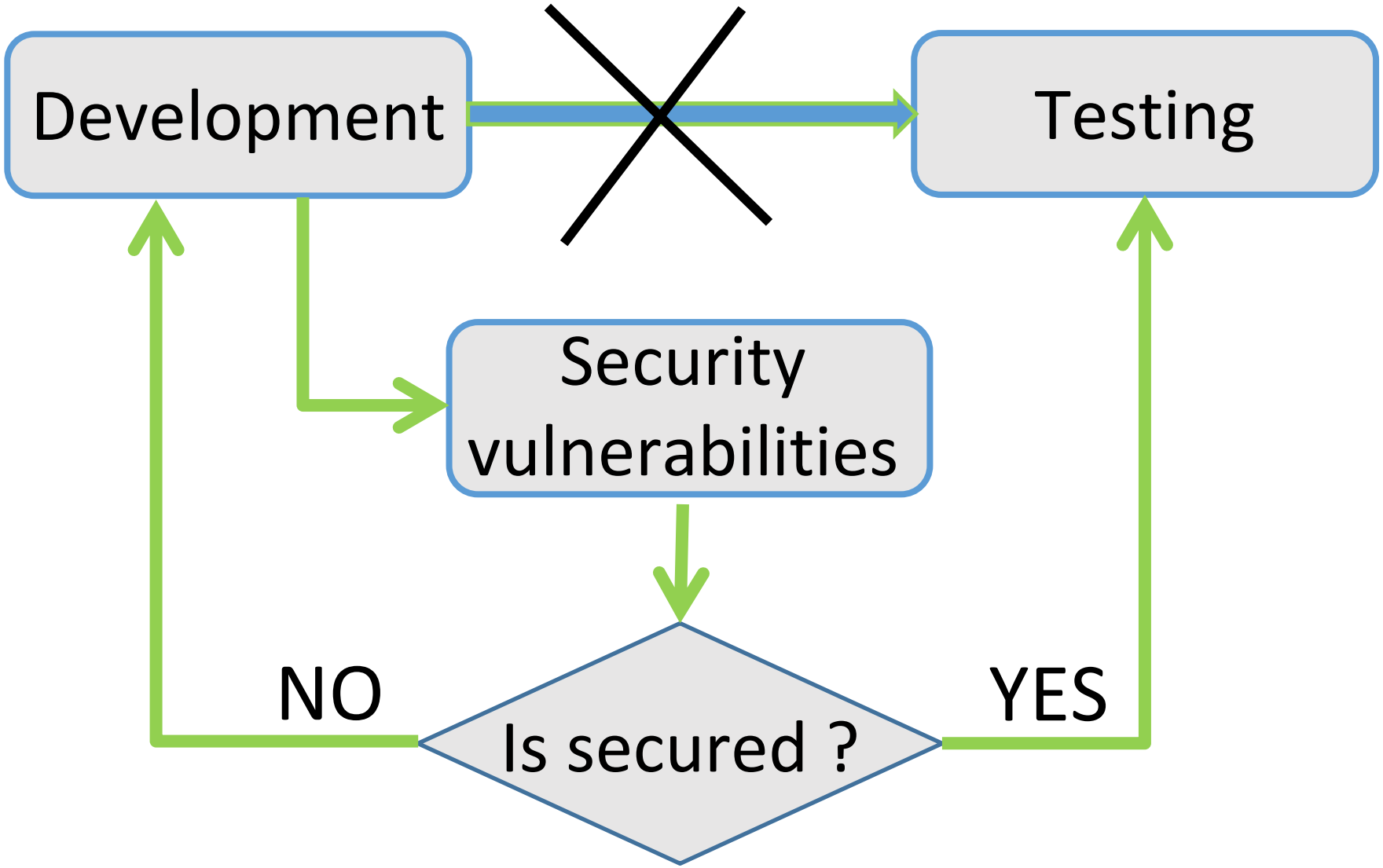
Are our APEX applications secured ?

when to check

what to check

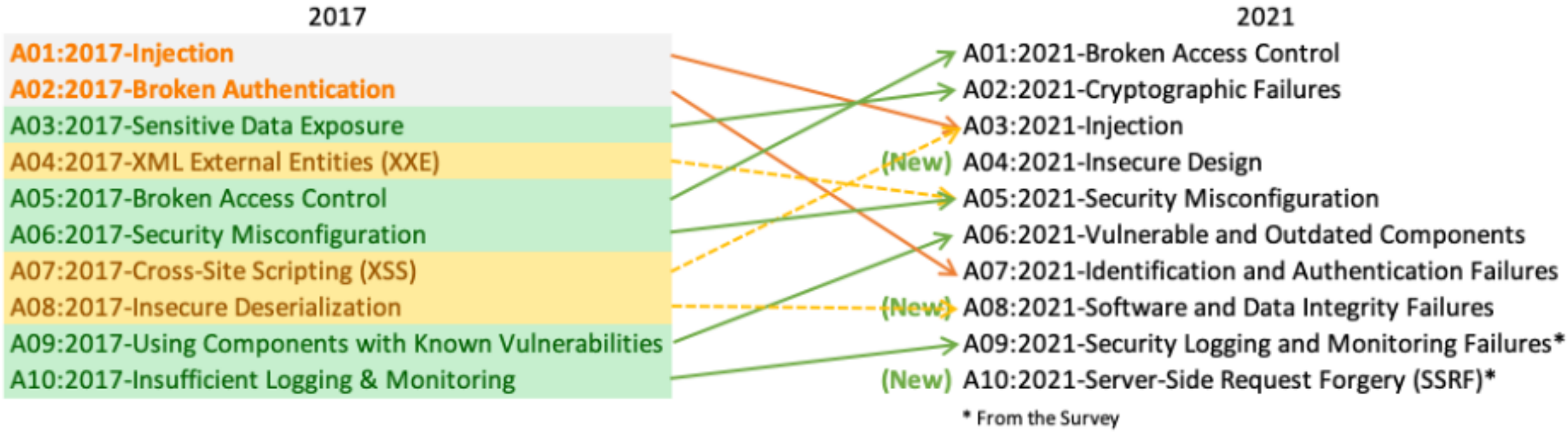
how to check

when to check



what to check

Top 10 Web Application Security Risks



Source: https://owasp.org/www-project-top-ten/

what to check

General

- Think of the se

Architecture:

- **Modula** interface
- **Isolatio** requests
- **Defens** protectio again all
- **Simplici**

Design

- Make **security-sensitive** parts of your code **sm**
- **Least privilege principle**: Don't require more p run your code as the least privileged user neces flag). Make sure that the account on which yo access and execute privileges that your code rea with admin privileges from your software;
- Choose **safe defaults**: For example, a randd change rather than a standard default password
- **Deny by default**: For example, when validating you expect rather than trying to block known "bad
- **Limit resource consumption**, to limit the likeli attack;
- **Fail securely**: For example, if there is a runtim rights, assume she has none;
- In distributed or Web applications **don't trust t** user input, perform security checks or authentica on the server side; remember that HTTP respon referrer etc.) and HTTP query string values (fro forged/manipulated;
- Cryptography: **Use trusted, public algorithm** invent your own cryptographic algorithms or pr reuse trusted code.

Coding

- **Don't trust input data**: Data coming from potentially malicious users is the single most common reason of security-related incidents (buffer overflow, SQL injection, Cross Site Scripting (XSS), code inside data etc.). Input data includes command-line arguments, configuration files (if accessible by not-trusted users), environment variables, cookies and POST/GET arguments etc;
- **Validate all input data**: Consider all input dangerous until proven valid, deny by default if not sure, validate at different levels, for example at input data entry point and before really using that data;
- **Don't make any assumptions about the environment**: make sure your code doesn't break with modified/malicious PATH, CLASSPATH and others environment variables, current directory, @INC Perl variable, umask, signals, open file descriptors etc;
- **Beware of race condition**: Can your code run parallel? what if someone executes two instances of your program at the same time, or changes environment in the middle of its execution?
- **Deal with errors and exceptions**: Don't assume that everything will work (especially file operations, system and network calls), catch exceptions, check result codes; don't display internal error messages, failing SQL query, stack trace etc;
- **Fail gracefully**: If there is an unexpected error that you can't recover from, then log details, alert the administrator, clean the system (delete temporary files, clear memory) and inform the user;
- **Protect passwords and secret information**: don't hard-code passwords (it's hard to change them and easy to disclose), use external files instead (possibly encrypted) or already existing credentials (like certificates), or simply ask the user for the password;
- **Be careful when handling files**: If you want to create it, report an error if it already exists; when you create it, set file permissions; if you open a file to read data, don't ask for write access; check if the file you open is not a link with the lstat() function (before and after opening the file); use absolute pathnames (for both commands and files); be extra careful when the filename (or part of it) comes from a user;
- **Temporary files**: Avoid them whenever possible. Pipes are a safer and more efficient way of communicating information between processes. If you really need remporary files, don't fall for the symbolic link attack (someone guesses the name of your temporary file, and creates a link from it to another file e.g. /bin/bash, that your program overwrites). Temporary files must have unique names that are hard to guess! (use tmpfile() for C/C++, mktemp shell command etc.);
- **Be careful with shell calls, eval functions etc.**: Such functions evaluate the string argument as code and interpret it, or run it on the shell. If an attacker managed to inject malicious input to that argument, you're executing his code.

Source:
https://security.web.cern.ch/recommendations/en/checklist_for_coders.shtml

how to check - Tools

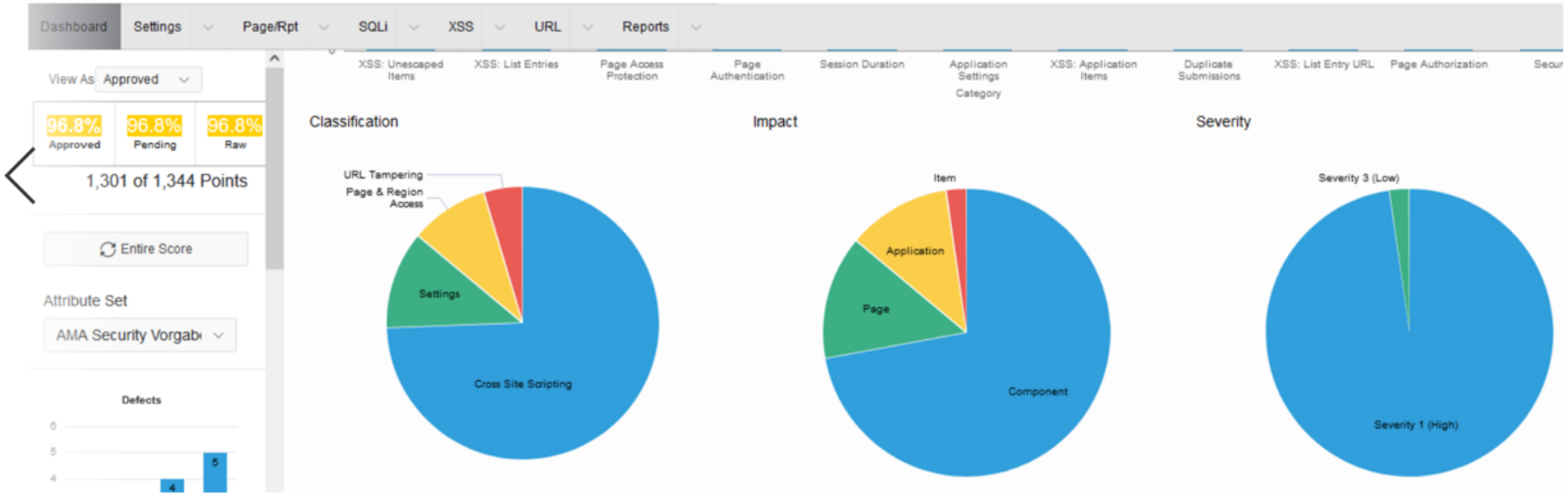
- APEX Sert
- APEXSec
- Adviser
- APEX Project Eye
- **DIY Tool**

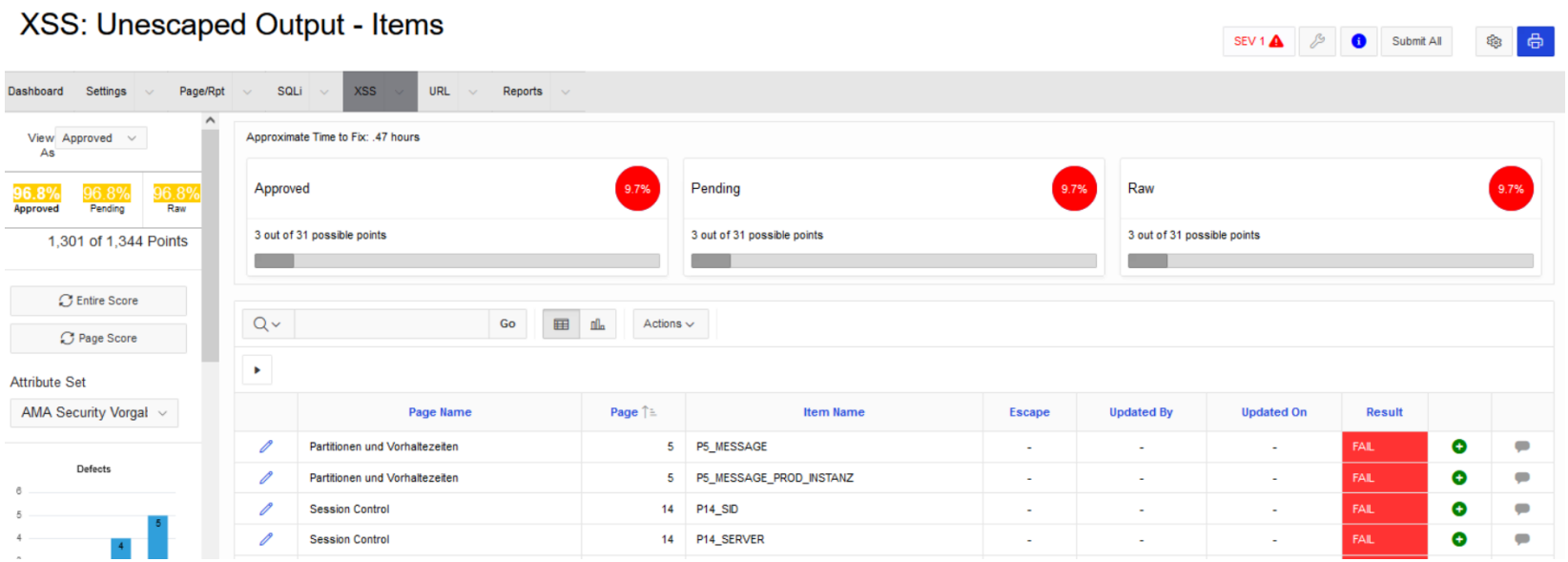
APEX Sert

APEX application that evaluates your APEX applications for security vulnerabilities

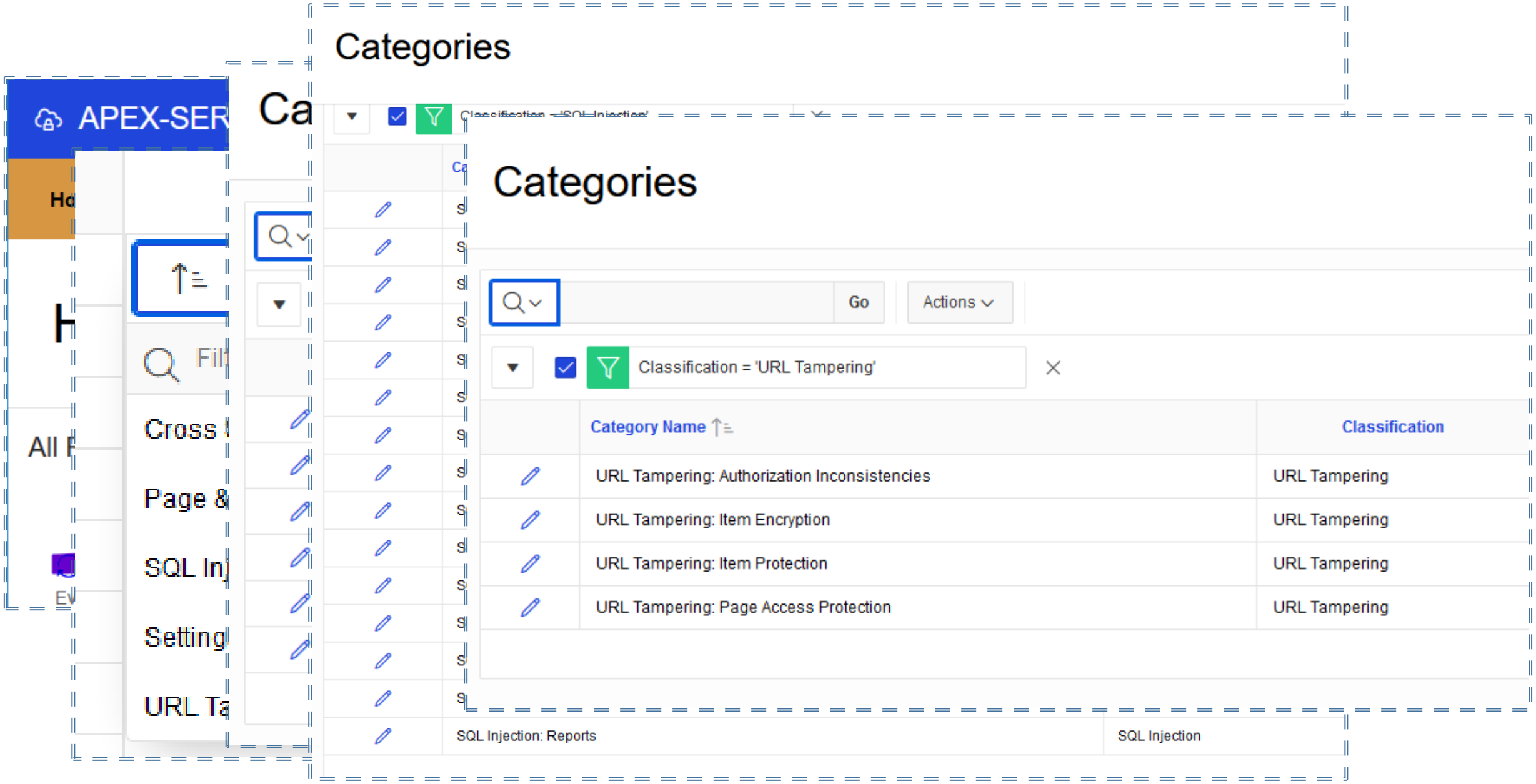
supports APEX 4.2, 5.0 & 5.1

https://github.com/OraOpenSource/apex-sert



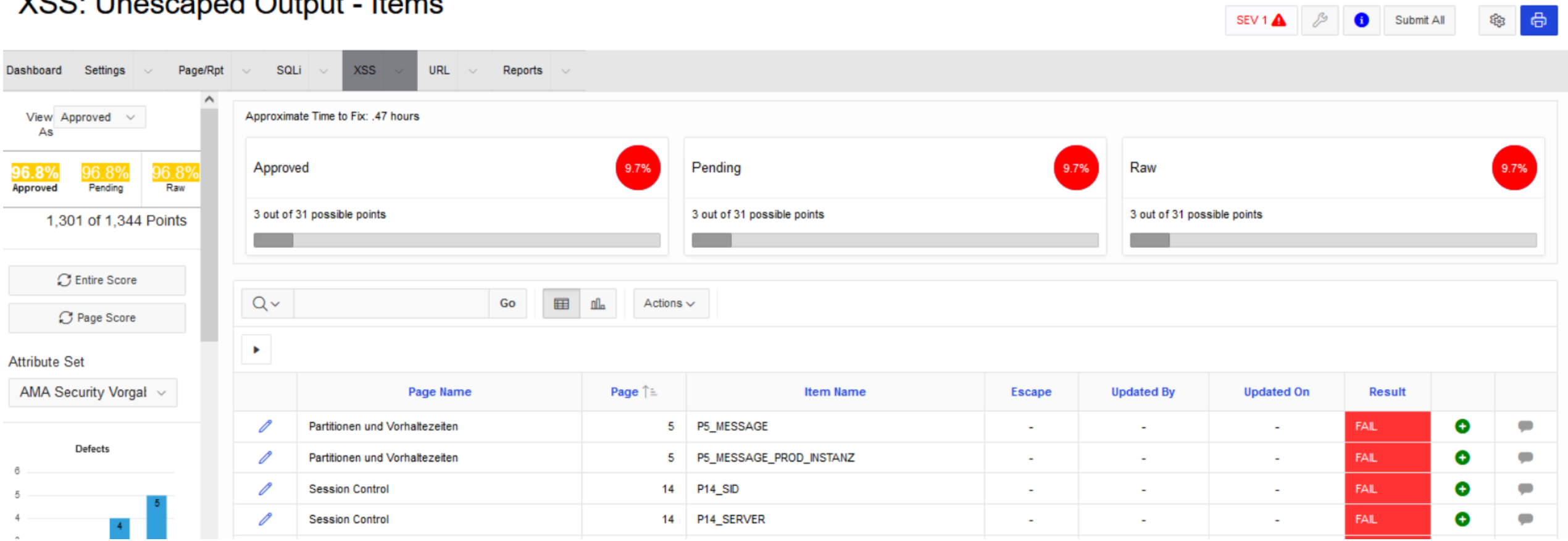


APEX Sert


Categories
Categories
Go
Actions
Classification = 'URL Tampering'
Category Name
Classification
URL Tampering: Authorization Inconsistencies
URL Tampering
URL Tampering: Item Encryption
URL Tampering
URL Tampering: Item Protection
URL Tampering
URL Tampering: Page Access Protection
URL Tampering
SQL Injection: Reports
SQL Injection

APEX Sert

XSS: Unescaped Output - Items



DEMO

APEX Sert

Lino Schilde
@LinoSchilde

Dear #orclapex friends, I stumbled across an a coc
application hidden under FR-2201 a few days ago s

Here is an upgraded version of APEX SERT lschilde
/2023/03/apex-s...

Please post your feedback and any issue you migh

12:07 AM · Mar 16, 2023 · **2,263** Views

http://lschilde.blogspot.com/202
apex.html

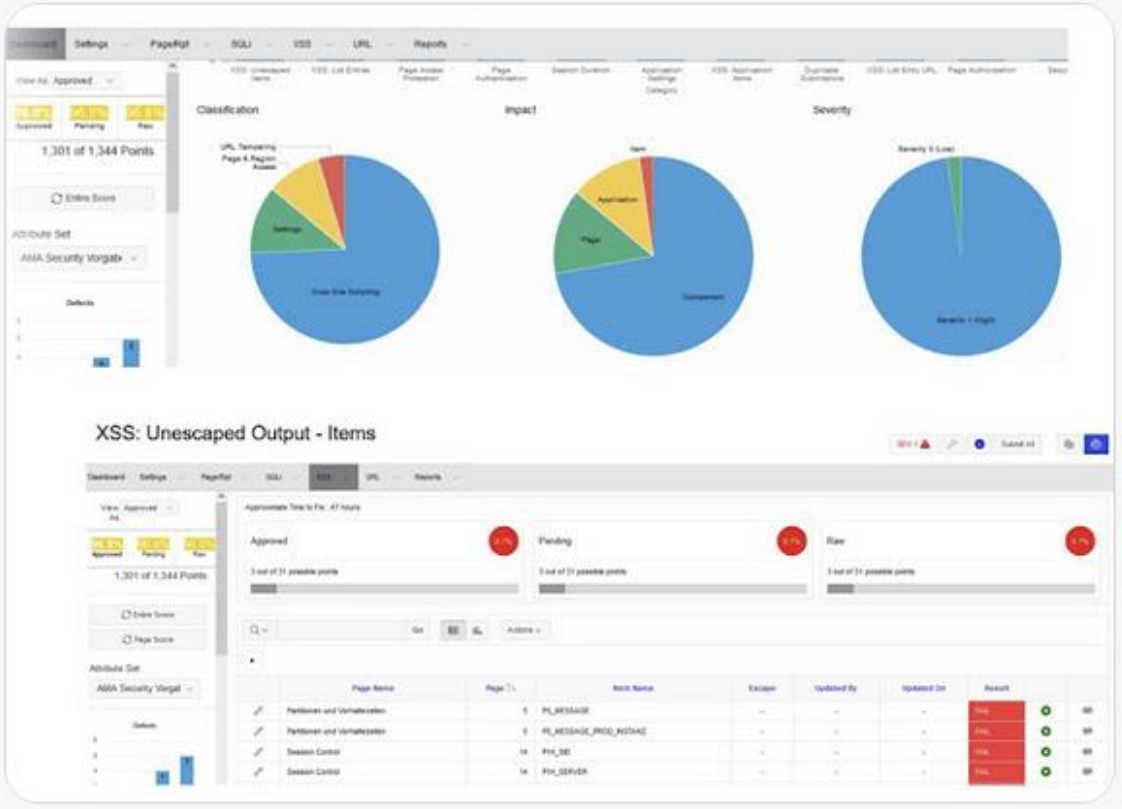
Lino Schilde @LinoSchilde · Apr 11

APEX SERT 22.2 is NOW available for download.

If you are running APEX 22.2 this is the version for you.

lschilde.blogspot.com/2023/04/apex-s...

#orclapex #share #provideFeedback



6 28 58 4,980

APEXSec

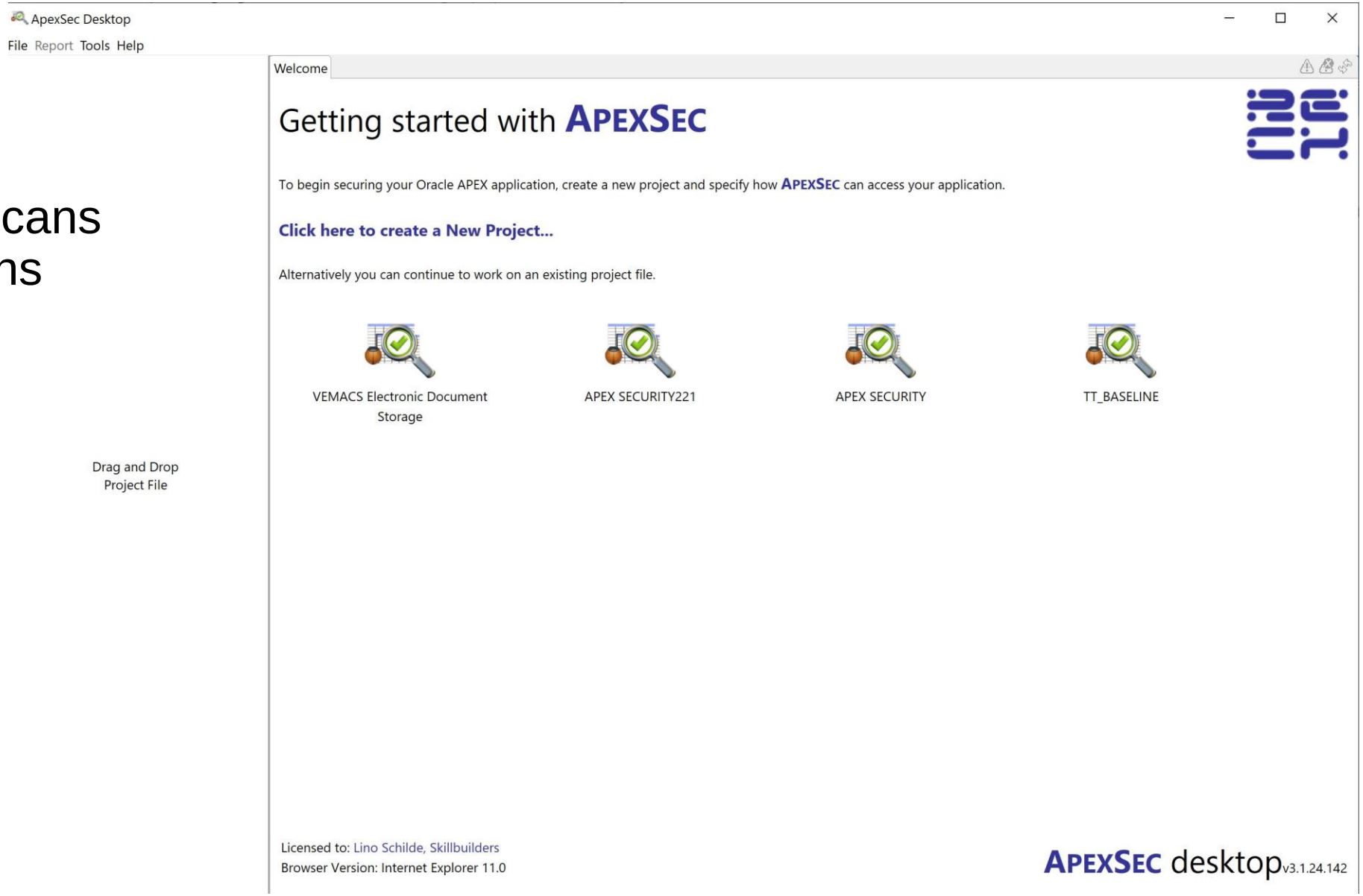
PROS

- performs security scans of APEX applications and DB code
- Offline scanning
- It is a commercial product

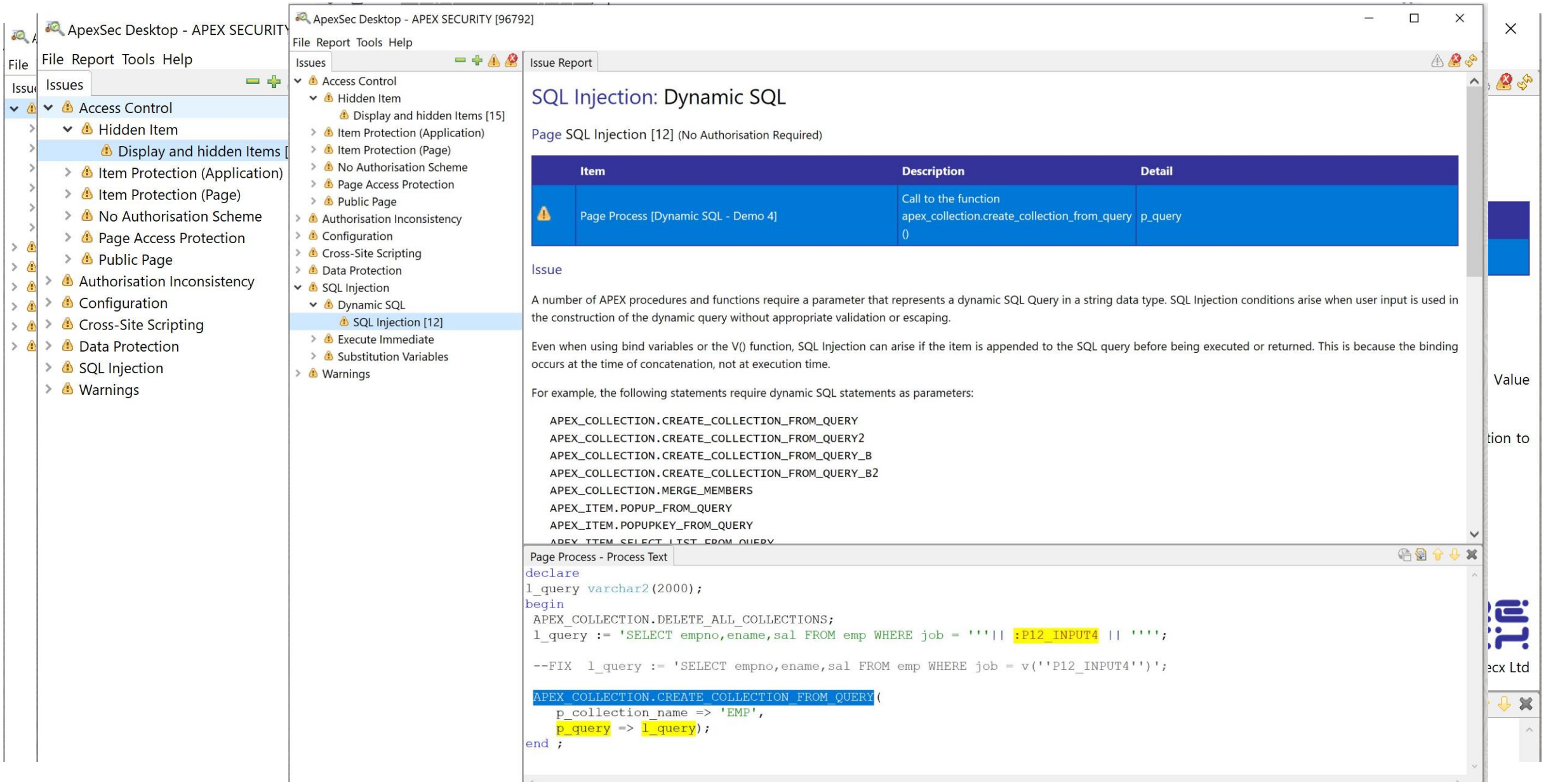
CONS

- It does not support exceptions and reviewing workflow

https://apexsec.recx.co.uk/



APEXSec


ApexSec Desktop - APEX SECURITY [96792]
File Report Tools Help
Issues
Access Control
Hidden Item
Display and hidden Items [15]
Item Protection (Application)
Item Protection (Page)
No Authorisation Scheme
Page Access Protection
Public Page
Authorisation Inconsistency
Configuration
Cross-Site Scripting
Data Protection
SQL Injection
Dynamic SQL
SQL Injection [12]
Execute Immediate
Substitution Variables
Warnings
Issue Report
SQL Injection: Dynamic SQL
Page SQL Injection [12] (No Authorisation Required)
Item
Description
Detail
Page Process [Dynamic SQL - Demo 4]
Call to the function apex_collection.create_collection_from_query ()
p_query
Issue
A number of APEX procedures and functions require a parameter that represents a dynamic SQL Query in a string data type. SQL Injection conditions arise when user input is used in the construction of the dynamic query without appropriate validation or escaping.
Even when using bind variables or the V() function, SQL Injection can arise if the item is appended to the SQL query before being executed or returned. This is because the binding occurs at the time of concatenation, not at execution time.
For example, the following statements require dynamic SQL statements as parameters:
APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERY
APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERY2
APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERY_B
APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERY_B2
APEX_COLLECTION.MERGE_MEMBERS
APEX_ITEM.POPUP_FROM_QUERY
APEX_ITEM.POPUPKEY_FROM_QUERY
Page Process - Process Text
declare
l_query varchar2(2000);
begin
APEX_COLLECTION.DELETE_ALL_COLLECTIONS;
l_query := 'SELECT empno,ename,sal FROM emp WHERE job = '''|| :P12_INPUT4 || '''';
--FIX l_query := 'SELECT empno,ename,sal FROM emp WHERE job = v(''P12_INPUT4'')';
APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERY(
p_collection_name => 'EMP',
p_query => l_query);
end ;

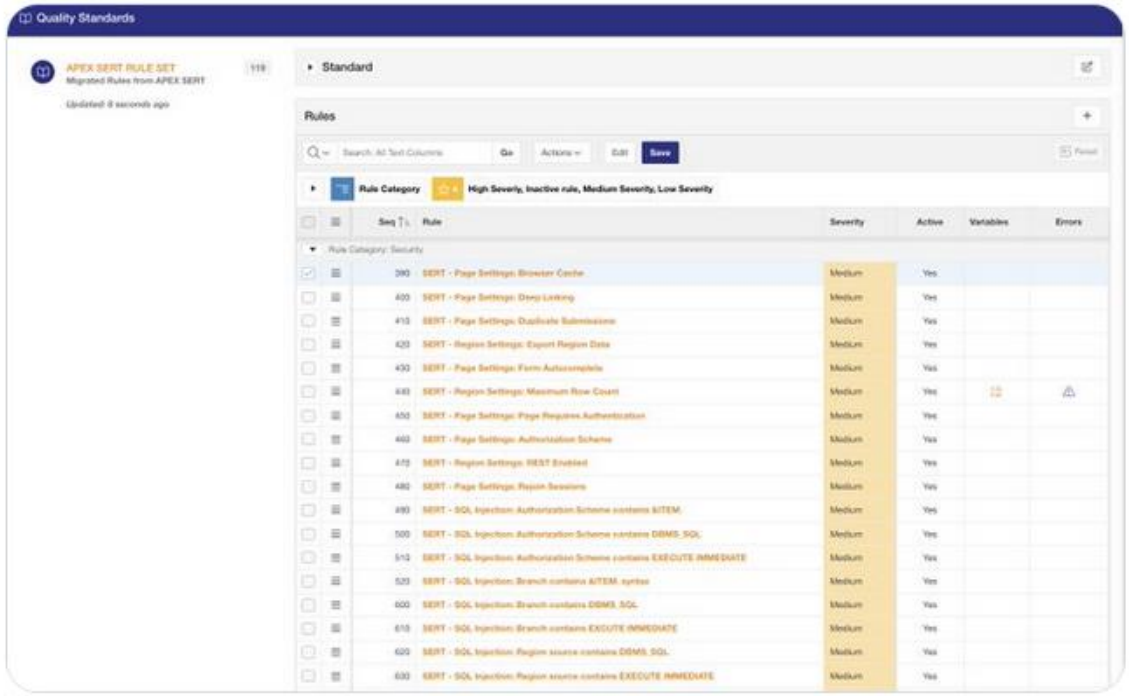
APEX Project Eye

APEX Project Eye (APE)
@APEXProjectEye

APEX-SERT quality assurance rules are now available to use with APEX Project Eye!

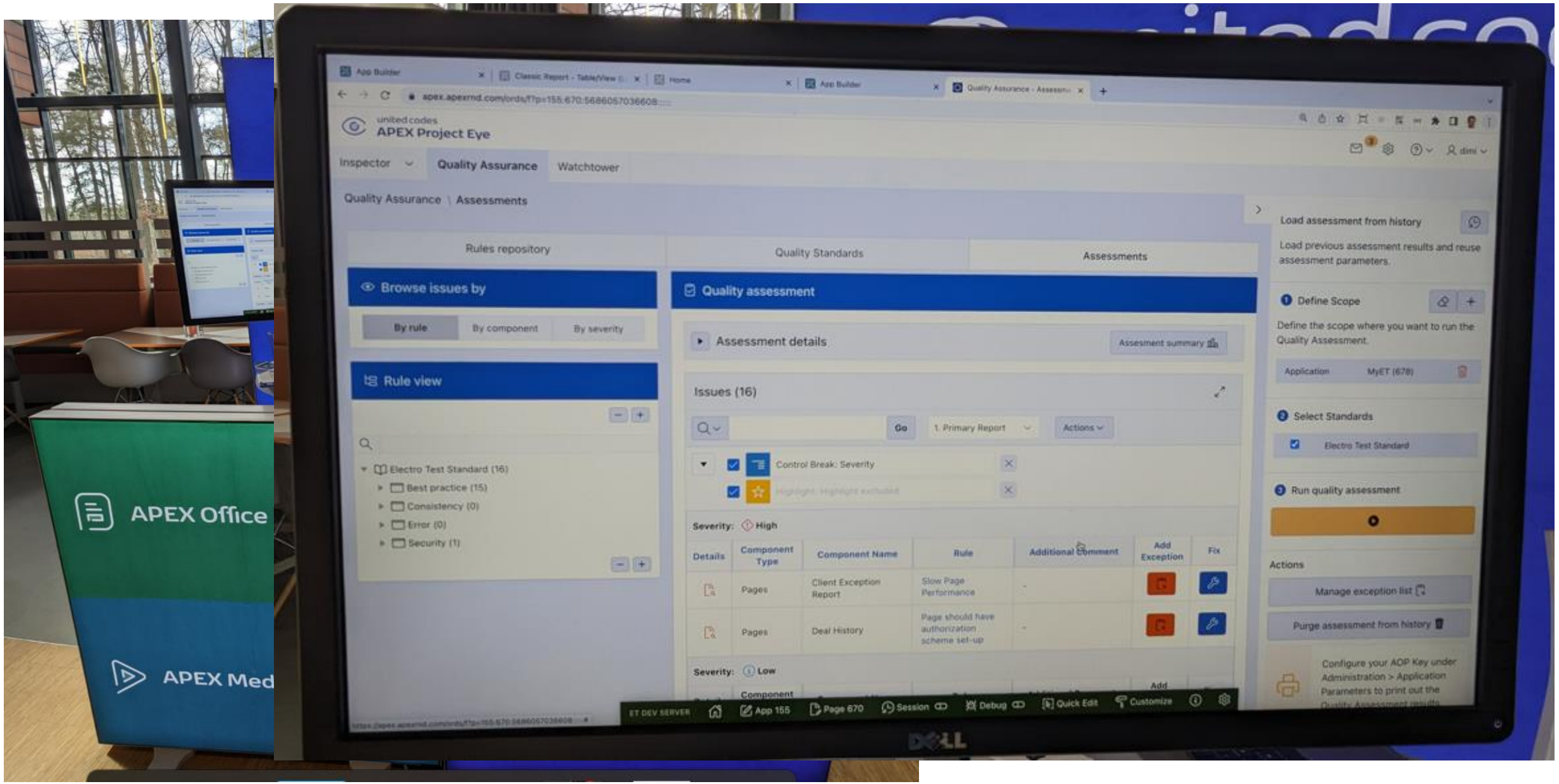
This rule set includes 100+ rules covering SQL injection, XSS, URL tampering, & much more. Helping you to create & maintain better quality, more secure #orclapex apps.

#lowcode #qualityassurance



3:59 PM · Feb 28, 2023 · **5,108** Views

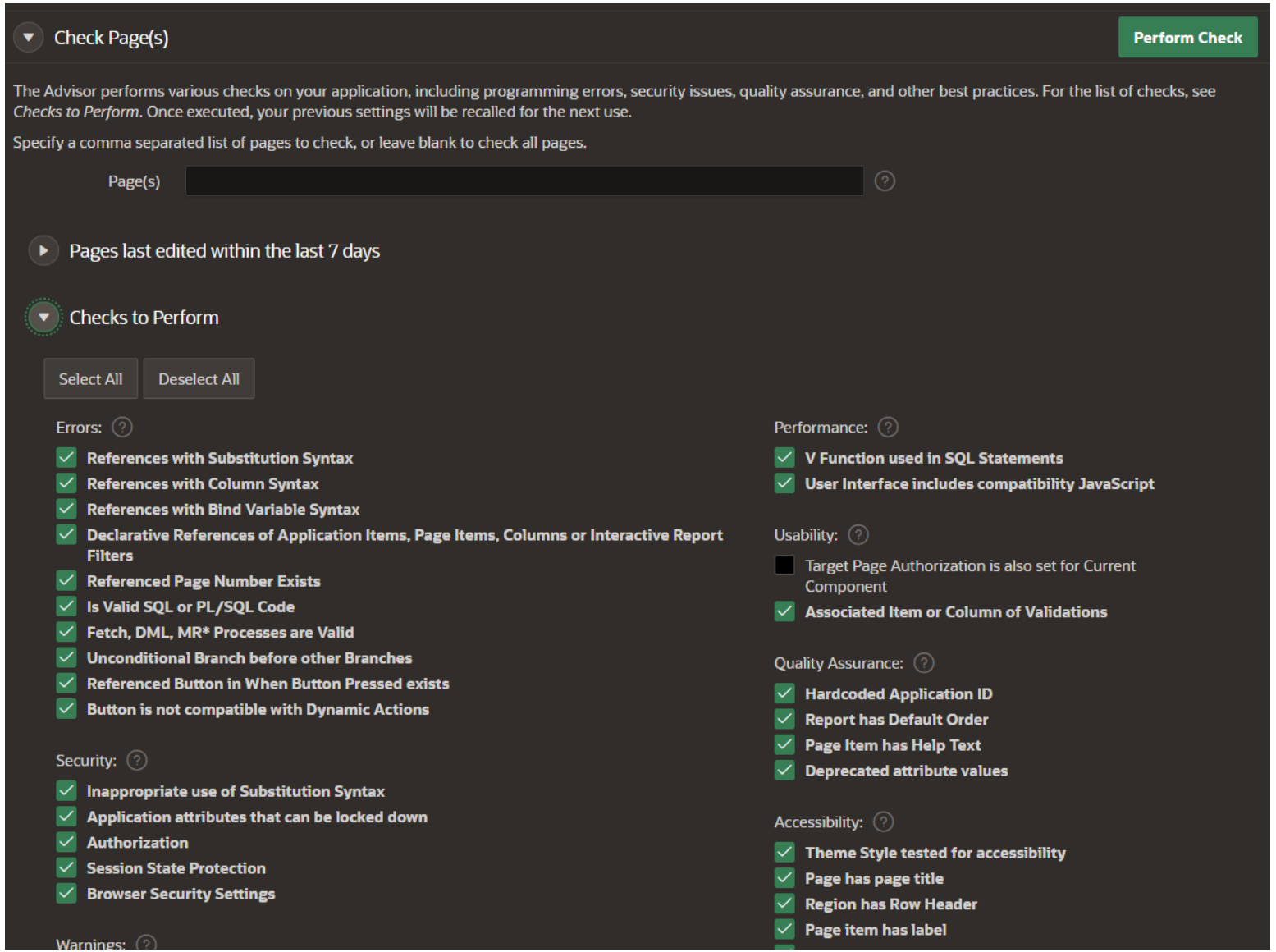
APEX Project Eye



APEX Adviser

perform various sanity checks on your application: checks for errors, security issues, performance bottlenecks, usability and quality assurance.

App Builder -> Application XXXXX -> Utilities



DIY Tool

Select * from < APEX Views>

- **apex_applications**
- apex_application_static_files
- apex_application_processes
- apex_application_pages
- **apex_application_page_regions**
- **apex_application_page_proc**
- apex_application_page_items
- apex_application_page_buttons
- apex_application_page_reg_cols
- **apex_application_page_rpt_cols**
- apex_appl_page_igs
- **apex_appl_page_ig_columns**
- apex_application_page_ir
- **apex_application_page_ir_col**
- apex_application_page_da_acts
- apex_application_list_entries
- apex_application_lists
- apex_application_lovs
- apex_application_page_map_layers

Code Editor - Code

```
1   alert("Entered value &P10_ITEM.");
2
3   alert("Entered value &P10_ITEM!JS.");
4
5   alert("Entered value " + $v('P10_ITEM'));
6
7   alert("Entered value " + apex.item("P10_ITEM").getValue());
8
9   alert("Entered value " + apex.items.P10_ITEM.value );
10
```

CAUTION

```
1   DECLARE
2   l_text CLOB;
3   l_email VARCHAR2(50);
4   l_name VARCHAR2(50);
5   BEGIN
6     SELECT 'dummy@demo.com' email, ' there.!!!!!!' name into l_email, l_name
7     from dual;
8
9     --l_text := 'LAST MESSAGE: &P9_COMMENT..' || utl_tcp.crlf;
10    l_text := 'LAST MESSAGE: ' || :P9_COMMENT || utl_tcp.crlf;
11
12    l_text := l_text || ' Changed by &APP_USER.'|| utl_tcp.crlf;
13    l_text := l_text ||' Hello ' || l_name || utl_tcp.crlf;
14
15    htp.p(l_text);
16  END;
```

CAUTION

```
8     l_text := 'LAST MESSAGE: ' || apex_escape.html(:P9_COMMENT) || utl_tcp.crlf;
```

Source

Form Region: - Select -

Type: Expression

Language: PL/SQL

PL/SQL Expression

```
apex_util.prepare_url('f?p=&APP_ID.:&APP_PAGE_ID.:&APP_SESSION.::::P9_MSG:&P9_MSG.')
```

CAUTION

```
1   declare
2   l_query varchar2(2000);
3   begin
4    APEX_COLLECTION.DELETE_ALL_COLLECTIONS;
5    l_query := 'SELECT empno,ename,sal FROM emp WHERE job = '''|| :P9_INPUT4 || '''';
6
7    APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERY(
8       p_collection_name => 'EMP',
9       p_query => l_query);
10  end ;
```

CAUTION

```
1  begin
2  if :P10_ITEM6 = :P10_ITEM6_1 then
3    htp.p('<h1>They match!<h1>');
4  else
5    htp.p('<h1>Ups sorry, ' || :P10_ITEM6 || ' does not match ' || :P10_ITEM6_1 || '.</h1>');
6
7  end if;
8  end;
```

CAUTION


secure programming
a way of writing code in a software so that it is protected from all kinds of vulnerabilities, attacks or anything that can cause harm to the software or the system using it

Coding

- **Don't trust input data**: Data coming from potentially malicious users is the single most common reason of security-related incidents (buffer overflow, SQL injection, Cross Site Scripting (XSS), code inside data etc.). Input data includes command-line arguments, configuration files (if accessible by not-trusted users), environment variables, cookies and POST/GET arguments etc;

Assume nothing

Believe no one

Confirm everything

Proper security configuration

Use Session State Protection

Hidden and Protected

Use Bind variable

ā'pěks

(#orclapex)

is

SAFE

What questions do you have?

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lschilde@gmail.com