InSpec Profiles* and HDF** include NIST SP 800-53 Security Control associations

DRAFT

March 2020

** built within the saf.mitre.org community and CMS ISPG GitHub*

*** Heimdall Data Format*

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Background – InSpec Profile Development Tool Chain

https://github.com/mitre/vulcan

DISA STIG

CIS Benchmarks

Vendor Security Checklist

Implementation Guides

Security Testing Content Development

https://inspec-tools.mitre.org/

https://github.com/mitre/ (*baseline)

MITRE Inspec_tools

Automated Conversion

Human Code Completion/Refinement

Validation Profiles

Security Validation as Code Execution

System(s) Under Evaluation

Master Nodes (3)

Ingest Nodes (X)

Data Nodes - Hot (X)

Data Nodes - Warm (X)

InSpec Engine

CCE, CVE, Least Functionality Tests

Data Mapping and Visualization Tools

"HDF", the Heimdall Data Format Includes NIST SP 800-53 associations for each test!

Validation Results

JSON

https://heimdall-tools.mitre.org/

sonarqube OWASP ZAP

Static & Dynamic Code Analysis

CWE Tests

Heimdall Lite

https://Heimdall-lite.mitre.org

Heimdall Server

https://github.com/mitre/heimdall

MITRE

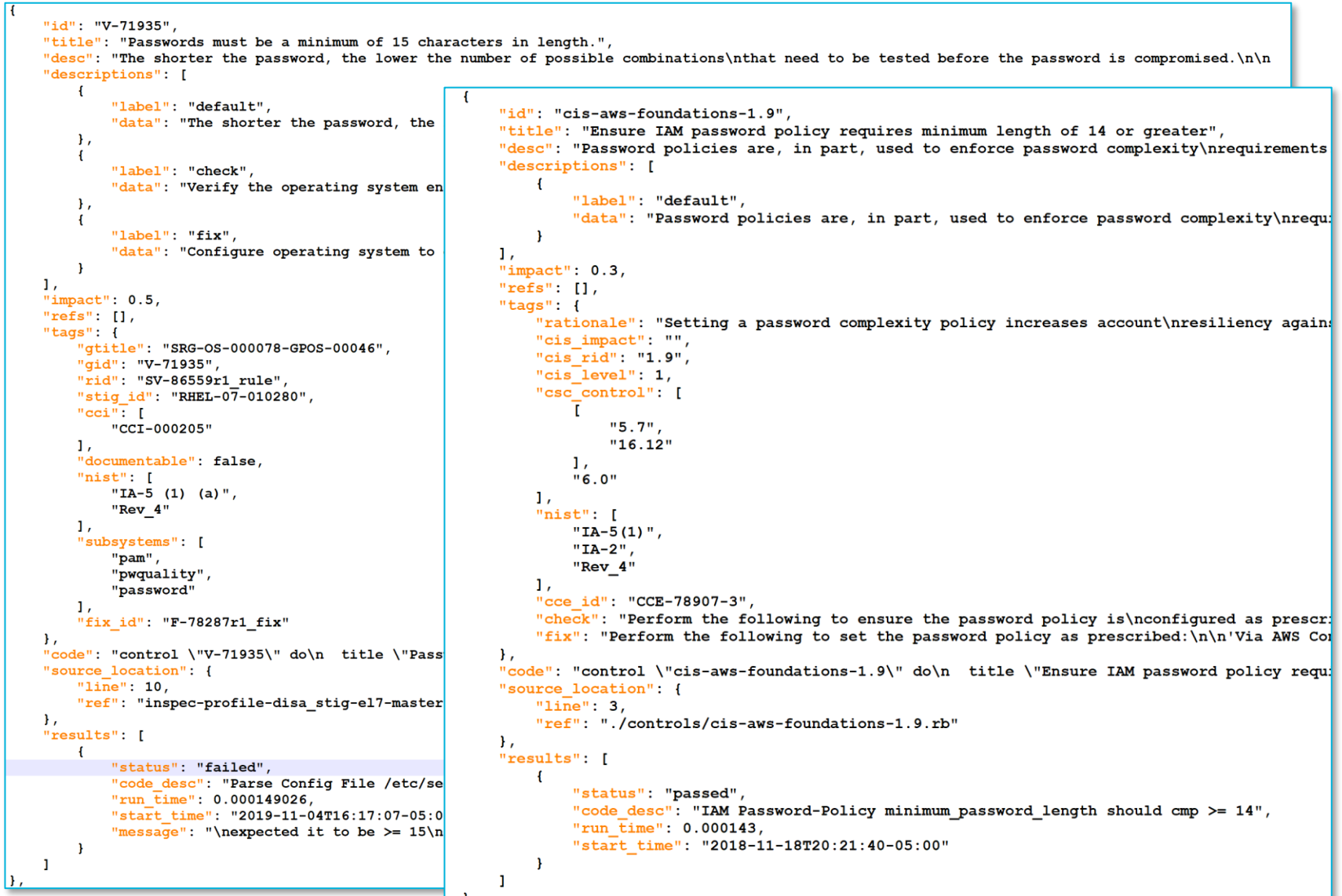
Background: The Heimdall Data Format (HDF)

Originally based on the InSpec JSON results reporter format, ISPG has extended and standardized it as the means of recording and transporting (i.e., via Splunk) security data from any source: InSpec profiles, SonarQube, Fortify, OWASP ZAP, etc.

HDF JSON File Schema:
https://github.com/mitre/inspecjs/blob/master/schemas/exec-json.json

HDF Splunk Schema:
https://github.com/mitre/hdf-json-to-splunk#control-event-structure

We are currently extending Heimdall_tools to convert output from Burp Suite Pro, Nessus, Nikto, Sneak, NetSparker, etc. to HDF.



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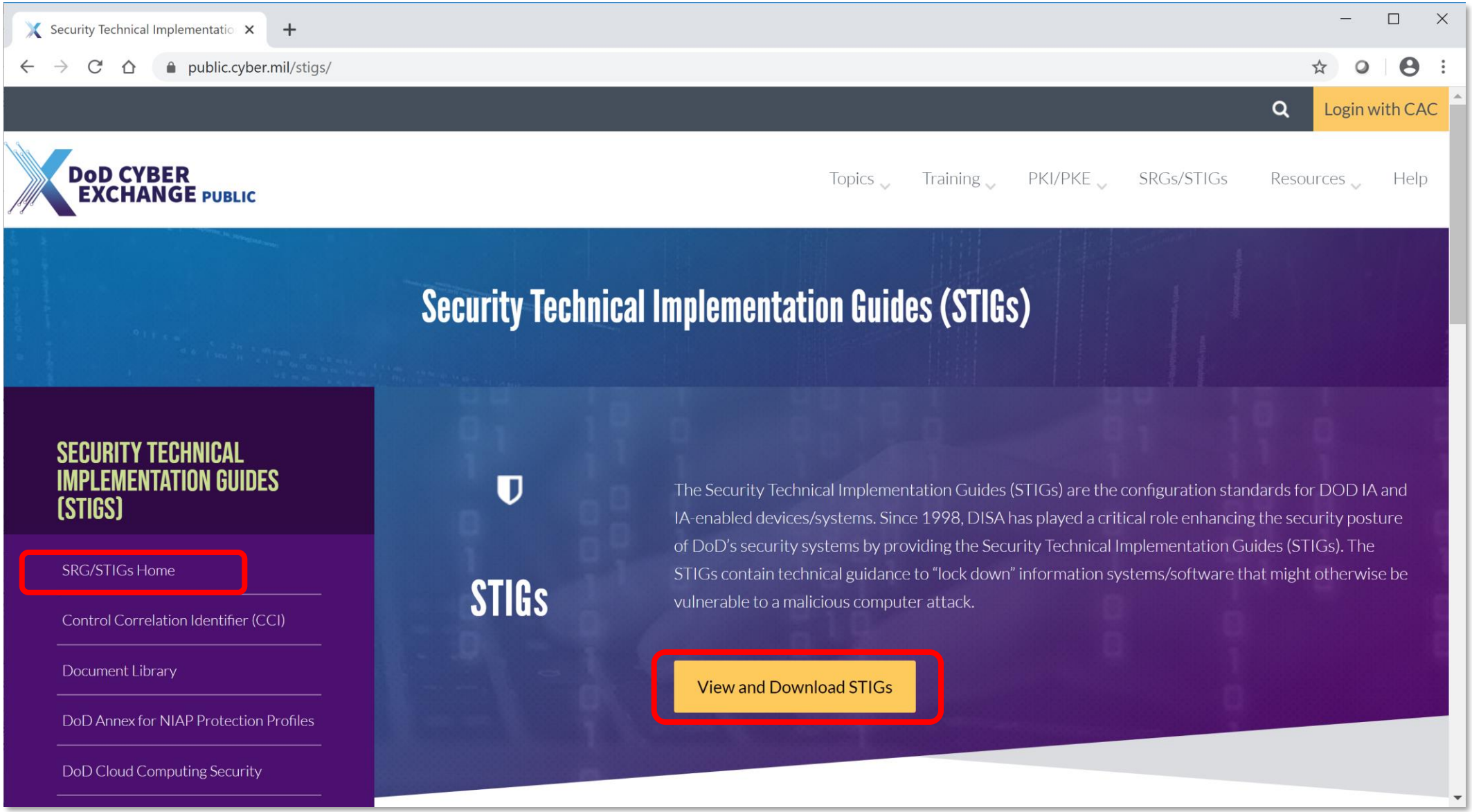
Use Case 1 of 3:
DISA STIG to InSpec Profile (with NIST SP 800-53)

DISA STIG Source



DISA STIG

https://public.cyber.mil/stigs/

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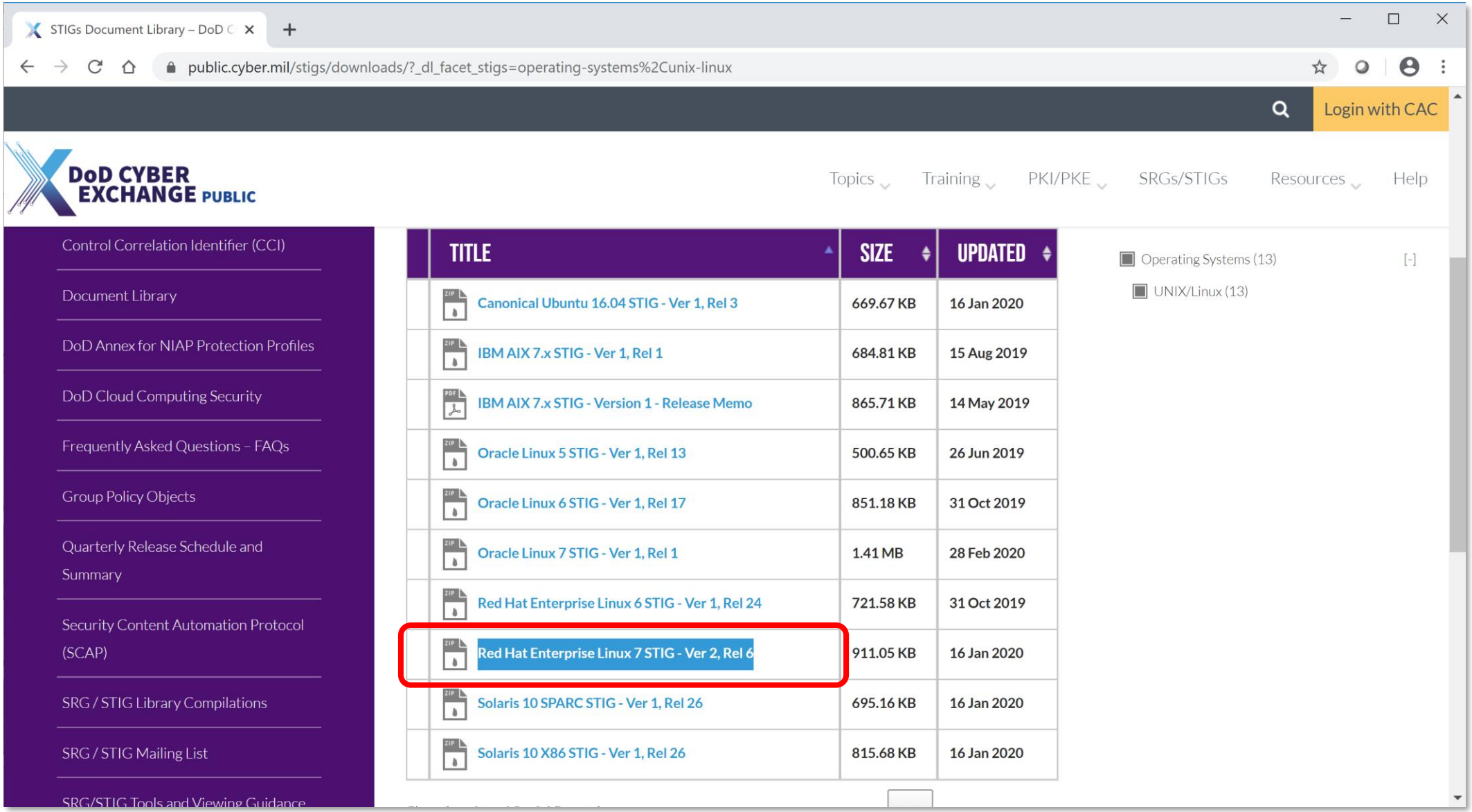
Example DISA STIG



https://public.cyber.mil/stigs/downloads/?_dl_facet_stigs=operating-systems%2Cunix-linux

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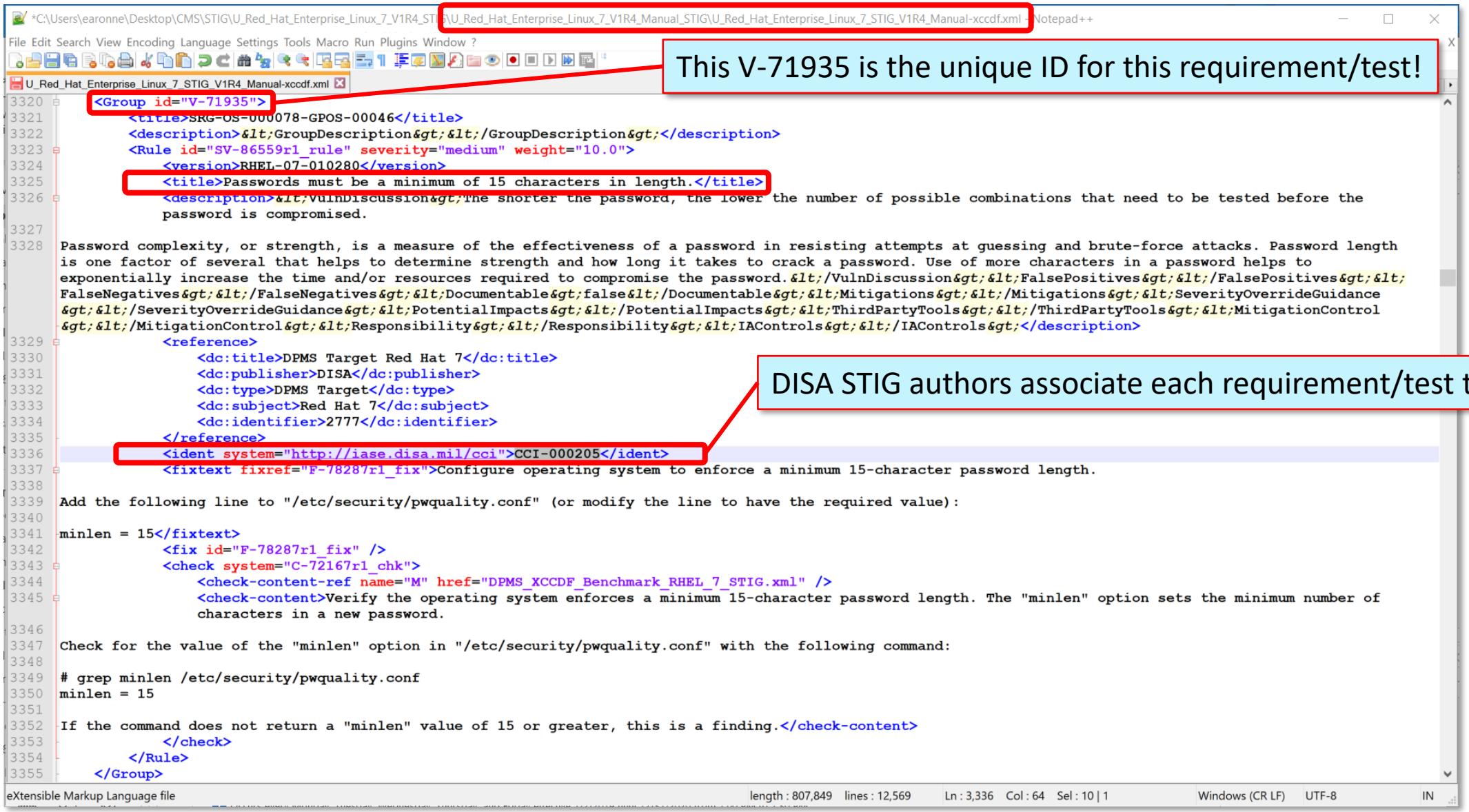
One of 200+ requirements in the DISA RHEL7 STIG:




```
<Group id="V-71935">
    <title>SRG-OS-000078-GPOS-00046</title>
    <description>&lt;GroupDescription&gt;&lt;/GroupDescription&gt;</description>
    <Rule id="SV-86559r1_rule" severity="medium" weight="10.0">
        <version>RHEL-07-010280</version>
        <title>Passwords must be a minimum of 15 characters in length.</title>
        <description>&lt;VulnDiscussion&gt;The shorter the password, the lower the number of possible combinations that need to be tested before the
        password is compromised.

Password complexity, or strength, is a measure of the effectiveness of a password in resisting attempts at guessing and brute-force attacks. Password length
is one factor of several that helps to determine strength and how long it takes to crack a password. Use of more characters in a password helps to
exponentially increase the time and/or resources required to compromise the password.&lt;/VulnDiscussion&gt;&lt;FalsePositives&gt;&lt;/FalsePositives&gt;&lt;
FalseNegatives&gt;&lt;/FalseNegatives&gt;&lt;Documentable&gt;false&lt;/Documentable&gt;&lt;Mitigations&gt;&lt;/Mitigations&gt;&lt;SeverityOverrideGuidance
&gt;&lt;/SeverityOverrideGuidance&gt;&lt;PotentialImpacts&gt;&lt;/PotentialImpacts&gt;&lt;ThirdPartyTools&gt;&lt;/ThirdPartyTools&gt;&lt;MitigationControl
&gt;&lt;/MitigationControl&gt;&lt;Responsibility&gt;&lt;/Responsibility&gt;&lt;IAControls&gt;&lt;/IAControls&gt;</description>
        <reference>
            <dc:title>DPMS Target Red Hat 7</dc:title>
            <dc:publisher>DISA</dc:publisher>
            <dc:type>DPMS Target</dc:type>
            <dc:subject>Red Hat 7</dc:subject>
            <dc:identifier>2777</dc:identifier>
        </reference>
        <ident system="http://iase.disa.mil/cci">CCI-000205</ident>
        <fixtext fixref="F-78287r1_fix">Configure operating system to enforce a minimum 15-character password length.

Add the following line to "/etc/security/pwquality.conf" (or modify the line to have the required value):

minlen = 15</fixtext>
        <fix id="F-78287r1_fix" />
        <check system="C-72167r1_chk">
            <check-content-ref name="M" href="DPMS_XCCDF_Benchmark_RHEL_7_STIG.xml" />
            <check-content>Verify the operating system enforces a minimum 15-character password length. The "minlen" option sets the minimum number of
            characters in a new password.

Check for the value of the "minlen" option in "/etc/security/pwquality.conf" with the following command:

# grep minlen /etc/security/pwquality.conf
minlen = 15

If the command does not return a "minlen" value of 15 or greater, this is a finding.</check-content>
        </check>
    </Rule>
</Group>
```

*(STIG in XML form found in the ZIP download file: **U_Red_Hat_Enterprise_Linux_7_STIG_V1R4_Manual-xccdf.xml**)*

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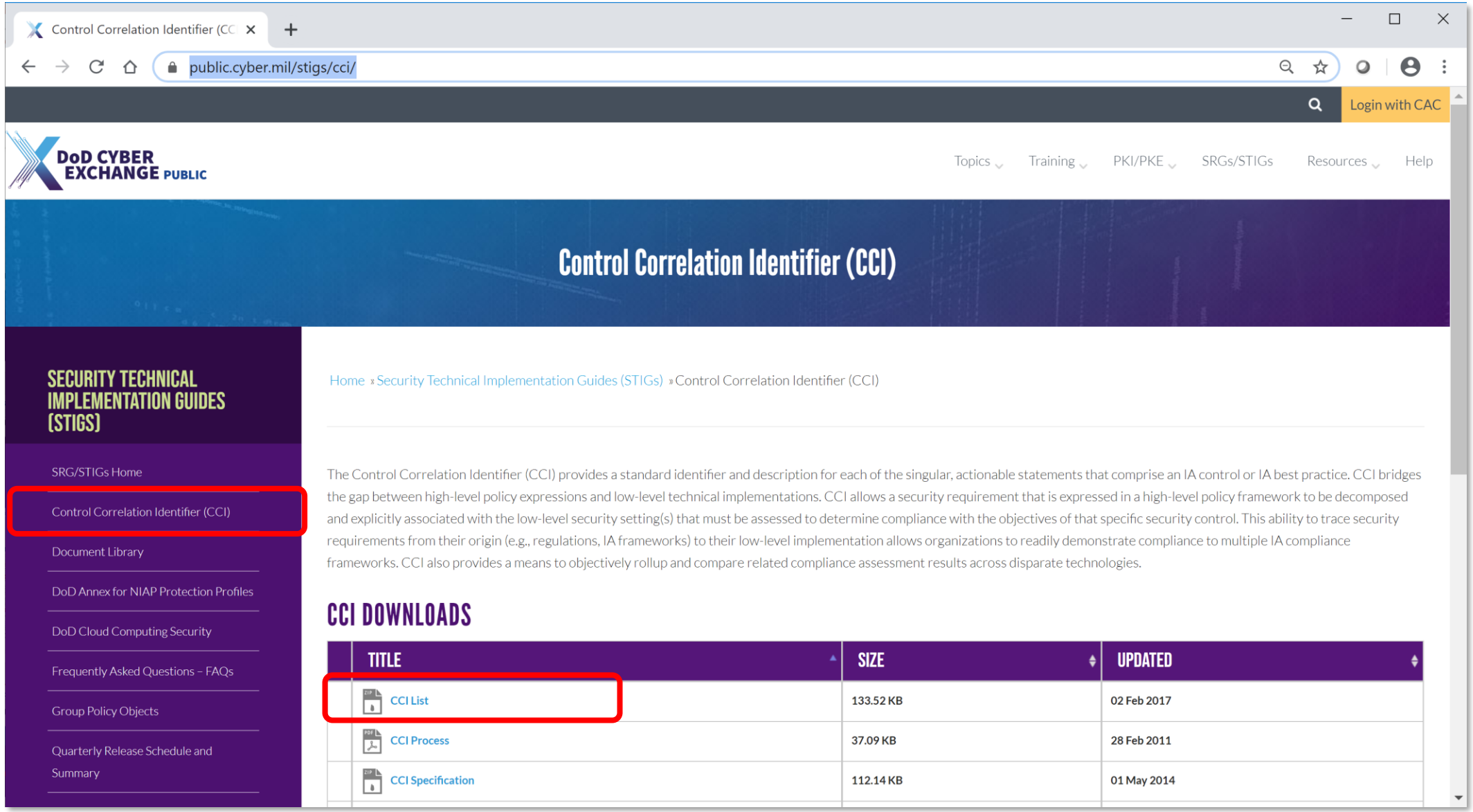
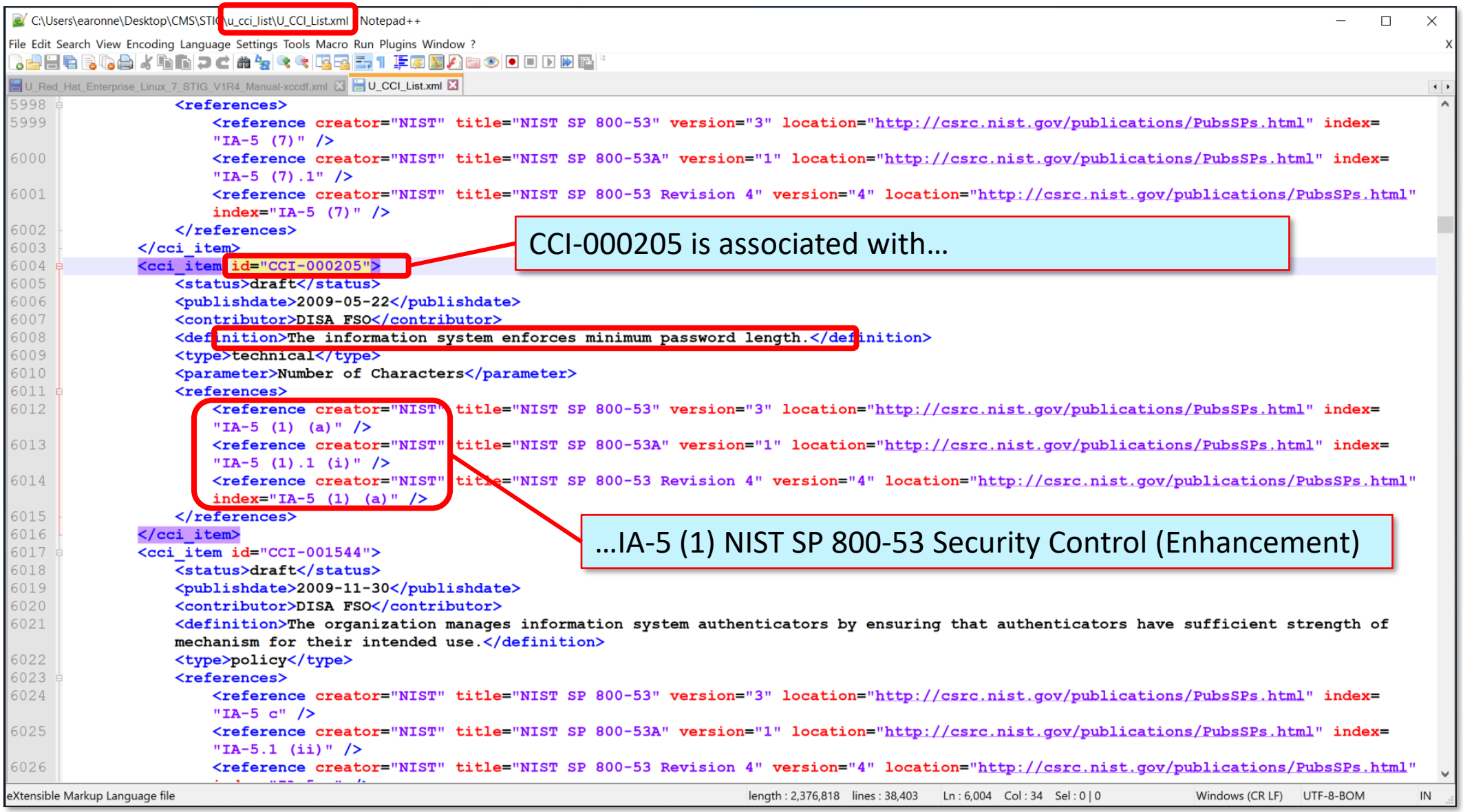
CCIs are DISA's Control Correlation Identifiers



https://public.cyber.mil/stigs/cci/

MITRE

Each CCI maps to one or more NIST SP 800-53 Controls



*(CCI list in XML form found in the ZIP download file: **U_CCI_List.xml**)*

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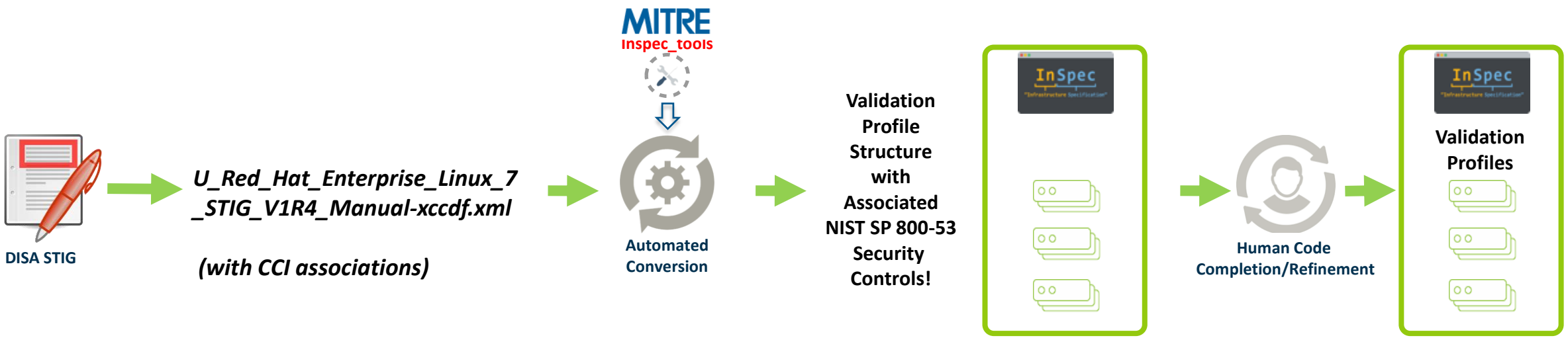
MITRE's InSpec_tools Generates the STIG InSpec Profile Structure

https://dl.dod.cyber.mil/wp-content/uploads/stigs/zip/u_cci_list.zip

DISA's U_CCI_List.xml
(map of CCIs to NIST)

https://github.com/mitre/**inspec_tools**/blob/master/lib/data/U_CCI_List.xml



https://inspec-tools.mitre.org/

One of 200+ requirements from the RHEL7 STIG in InSpec Profile Code:

The unique STIG V-number,

title,

CCI,

and associated NIST SP 800-53 Security Control are included in the InSpec profile structure!

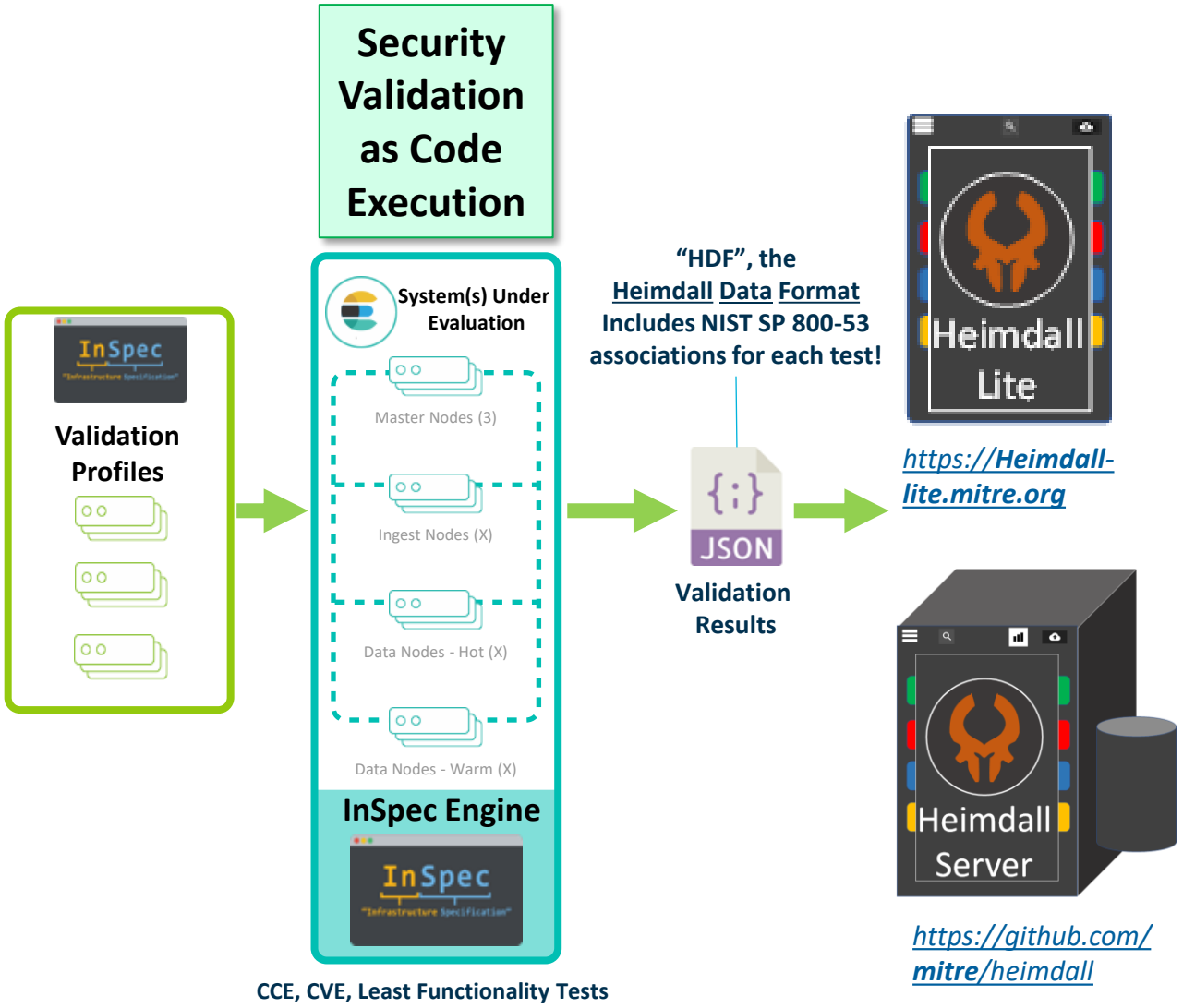
```
control "V-71935" do
  title "Passwords must be a minimum of 15 characters in length."
  desc  "
    The shorter the password, the lower the number of possible combinations
that need to be tested before the password is compromised.

    Password complexity, or strength, is a measure of the effectiveness of a
password in resisting attempts at guessing and brute-force attacks. Password
length is one factor of several that helps to determine strength and how long
it takes to crack a password. Use of more characters in a password helps to
exponentially increase the time and/or resources required to compromise the
password.
  "
  impact 0.5
  tag "gtitle": "SRG-OS-000078-GPOS-00046"
  tag "gid": "V-71935"
  tag "rid": "SV-86559r1_rule"
  tag "stig_id": "RHEL-07-010280"
  tag "cci": ["CCI-000205"]
  tag "documentable": false
  tag "nist": ["IA-5 (1) (a)", "Rev_4"]
  tag "subsystems": ['pam', 'pwquality', 'password']
  desc "check", "Verify the operating system enforces a minimum 15-character
password length. The \"minlen\" option sets the minimum number of characters in
a new password.

Check for the value of the \"minlen\" option in
```

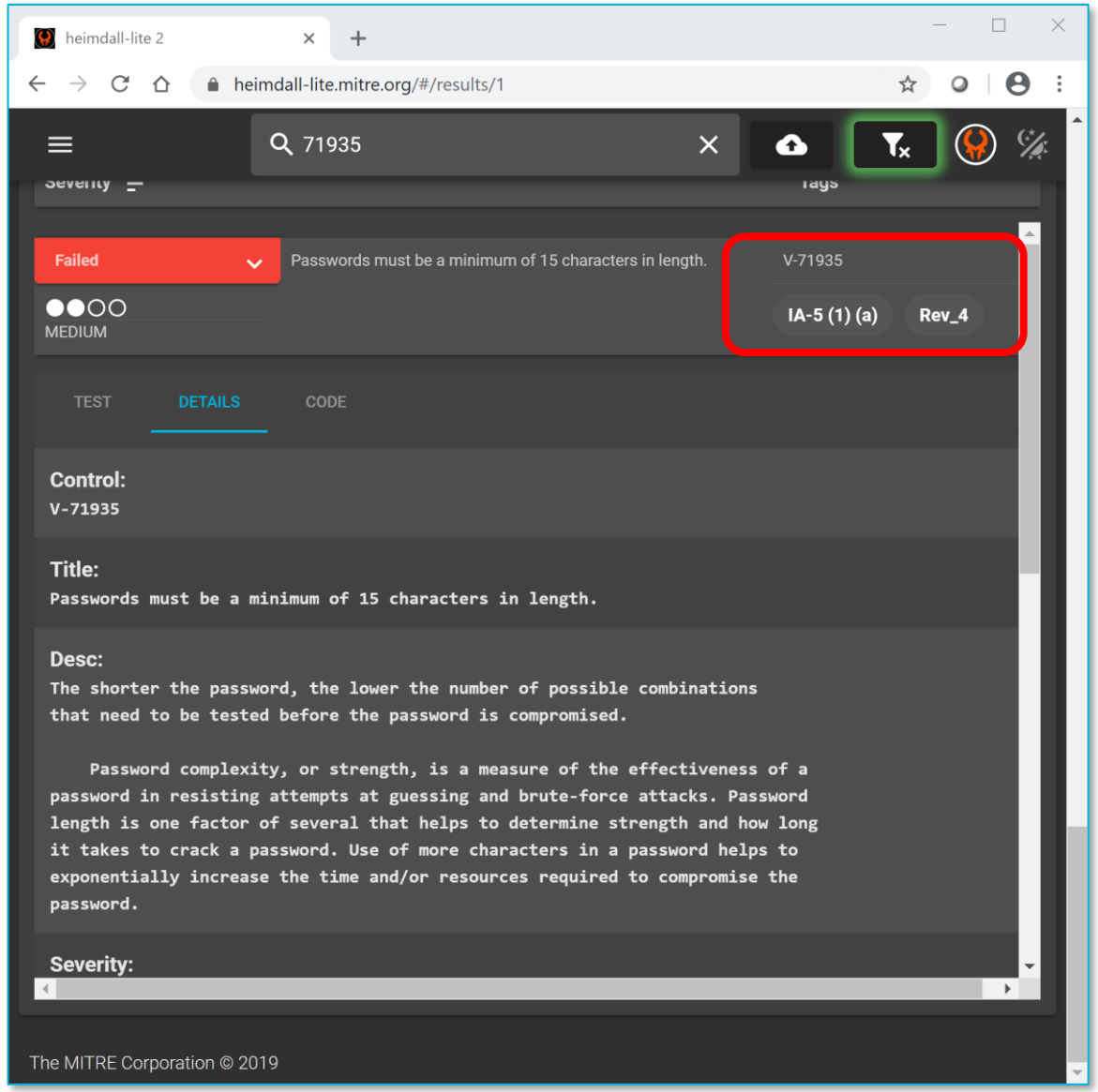
As well as all other original information from the STIG such as impact (i.e., CAT), check, and fix instructions

(https://github.com/CMSgov/inspec-profile-disa_stig-el7/blob/master/controls/V-71935.rb)

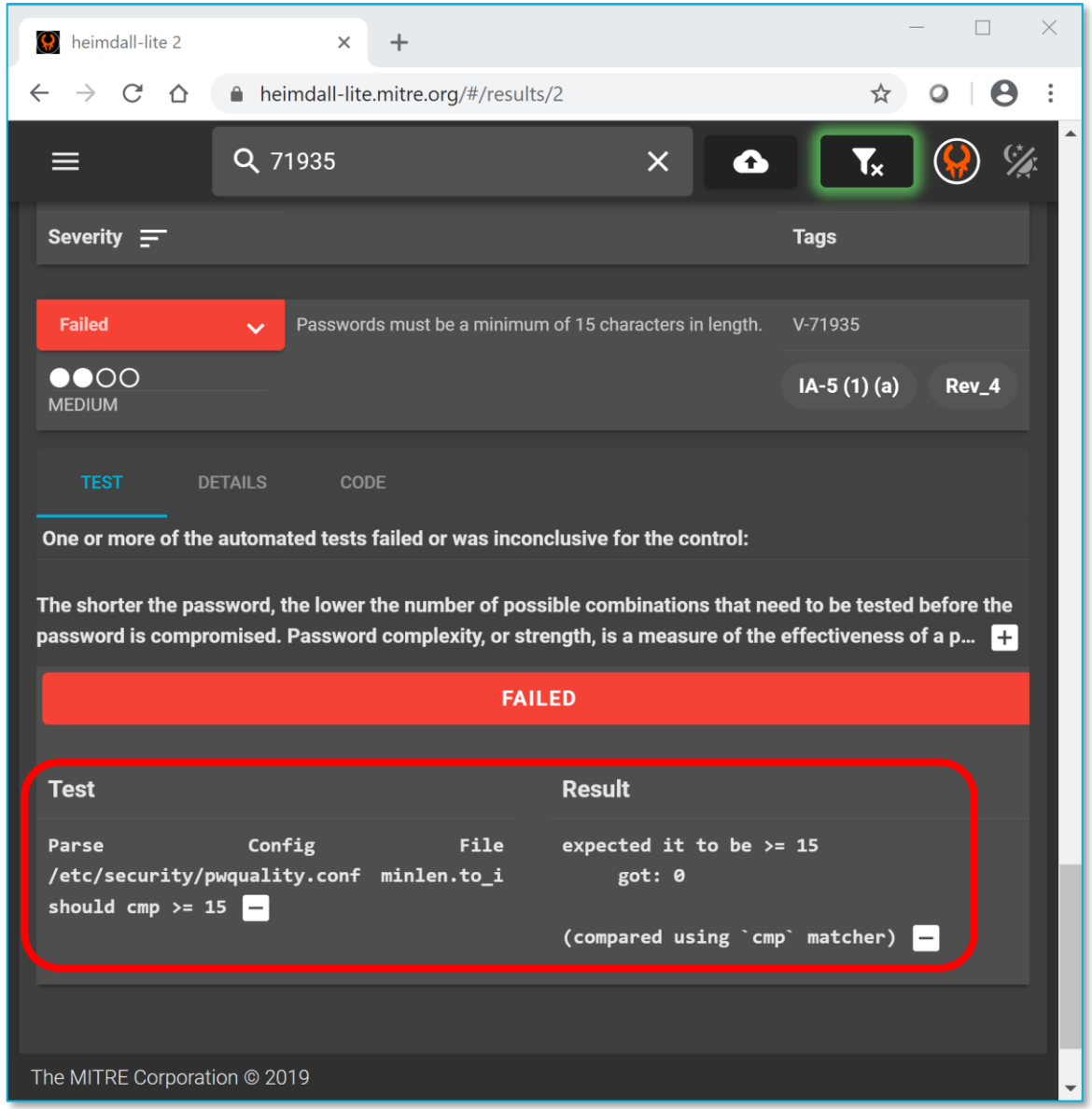
MITRE

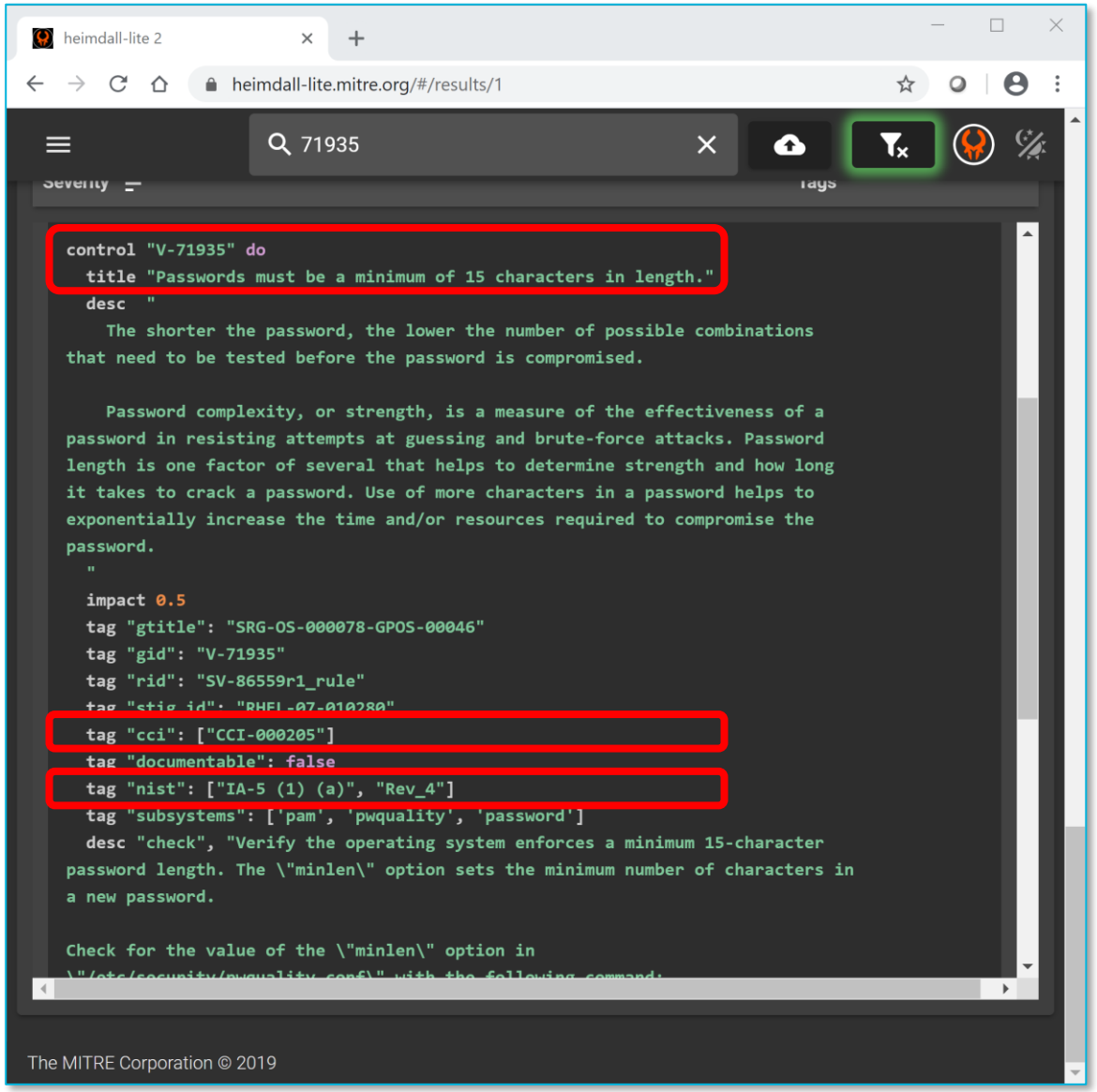
When STIG InSpec Profiles are run, test results and the InSpec code are included in the JSON validation results file, and viewable in MITRE's Heimdall





When STIG InSpec Profiles are run, test results and the InSpec code are included in the JSON validation results file, and viewable in MITRE's Heimdall





STIG InSpec Profile Validation Results JSON Heimdall Data Format (HDF) Sample:

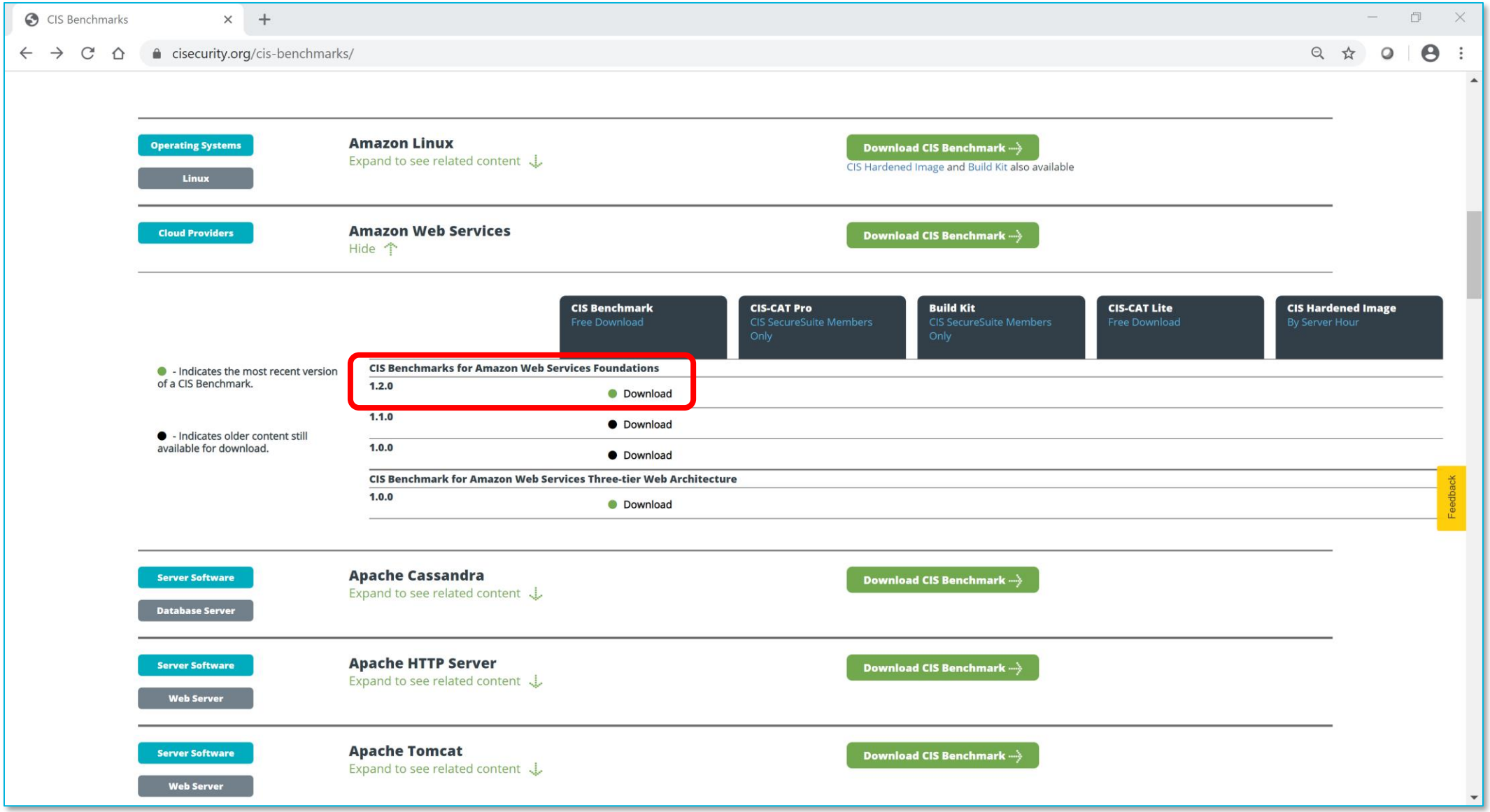

```
{
  "id": "V-71935",
  "title": "Passwords must be a minimum of 15 characters in length.",
  "desc": "The shorter the password, the lower the number of possible combinations\nthat need to be tested before the password is compromised.\n\n
  "descriptions": [
      {
          "label": "default",
          "data": "The shorter the password, the lower the number of possible combinations\nthat need to be tested before the password is compromise
      },
      {
          "label": "check",
          "data": "Verify the operating system enforces a minimum 15-character\npassword length. The \"minlen\" option sets the minimum number of cha
      },
      {
          "label": "fix",
          "data": "Configure operating system to enforce a minimum 15-character\npassword length.\n\nAdd the following line to \"/etc/security/pwqual
      }
  ],
  "impact": 0.5,
  "refs": [],
  "tags": {
      "gtitle": "SRG-OS-000078-GPOS-00046",
      "gid": "V-71935",
      "rid": "SV-86559r1_rule",
      "stig_id": "RHEL-07-010280",
      "cci": [
          "CCI-000205"
      ],
      "documentable": false,
      "nist": [
          "IA-5 (1) (a)",
          "Rev_4"
      ],
      "subsystems": [
          "pam",
          "pwquality",
          "password"
      ],
      "fix_id": "F-78287r1_fix"
  },
  "code": "control \"V-71935\" do\n  title \"Passwords must be a minimum of 15 characters in length.\"\n  desc  \"\n    The shorter the password, the
  "source_location": {
      "line": 10,
      "ref": "inspec-profile-disa_stig-el7-master/controls/V-71935.rb"
  },
  "results": [
      {
          "status": "failed",
          "code_desc": "Parse Config File /etc/security/pwquality.conf minlen.to_i should cmp >= 15",
          "run_time": 0.000149026,
          "start_time": "2019-11-04T16:17:07-05:00",
          "message": "\nexpected it to be >= 15\n     got: 0\n\n(compared using `cmp` matcher)\n"
      }
  ]
},
```

Use Case 2 of 3:
CIS Benchmark to InSpec Profile (with NIST SP 800-53)

CIS Benchmarks

MITRE

CIS Benchmark Source



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CIS Benchmarks

https://www.cisecurity.org/cis-benchmarks/

MITRE

Example: An AWS CIS Foundations Benchmark Test:

1.9 Ensure IAM password policy requires minimum length of 14 or greater (Scored)

Profile Applicability:

- Level 1

"1.9" is the ID for this requirement/test

Description:

Password policies are, in part, used to enforce password complexity requirements. IAM password policies can be used to ensure password are at least a given length. It is recommended that the password policy require a minimum password length 14.

Rationale:

Setting a password complexity policy increases account resiliency against brute force login attempts.

Audit:

Perform the following to ensure the password policy is configured as prescribed:
Via AWS Console

1. Login to AWS Console (with appropriate permissions to View Identity Access Management Account Settings)
2. Go to IAM Service on the AWS Console
3. Click on Account Settings on the Left Pane
4. Ensure "Minimum password length" is set to 14 or greater.

Via CLI

```
aws iam get-account-password-policy
```

Ensure the output of the above command includes "MinimumPasswordLength": 14 (or higher)

Remediation:

Perform the following to set the password policy as prescribed:
Via AWS Console

1. Login to AWS Console (with appropriate permissions to View Identity Access Management Account Settings)
2. Go to IAM Service on the AWS Console
3. Click on Account Settings on the Left Pane

CIS authors associate each requirement/test to a **CIS Control**

4. Set "Minimum password length" to 14 or greater.
5. Click "Apply password policy"

Via CLI

```
aws iam update-account-password-policy --minimum-password-length 14
```

Note: All commands starting with "aws iam update-account-password-policy" can be combined into a single command.

References:

1. CCE-78907-3
2. CIS CSC v6.0 #5.7, #16.12

CIS Controls:

16 Account Monitoring and Control
Account Monitoring and Control

MITRE

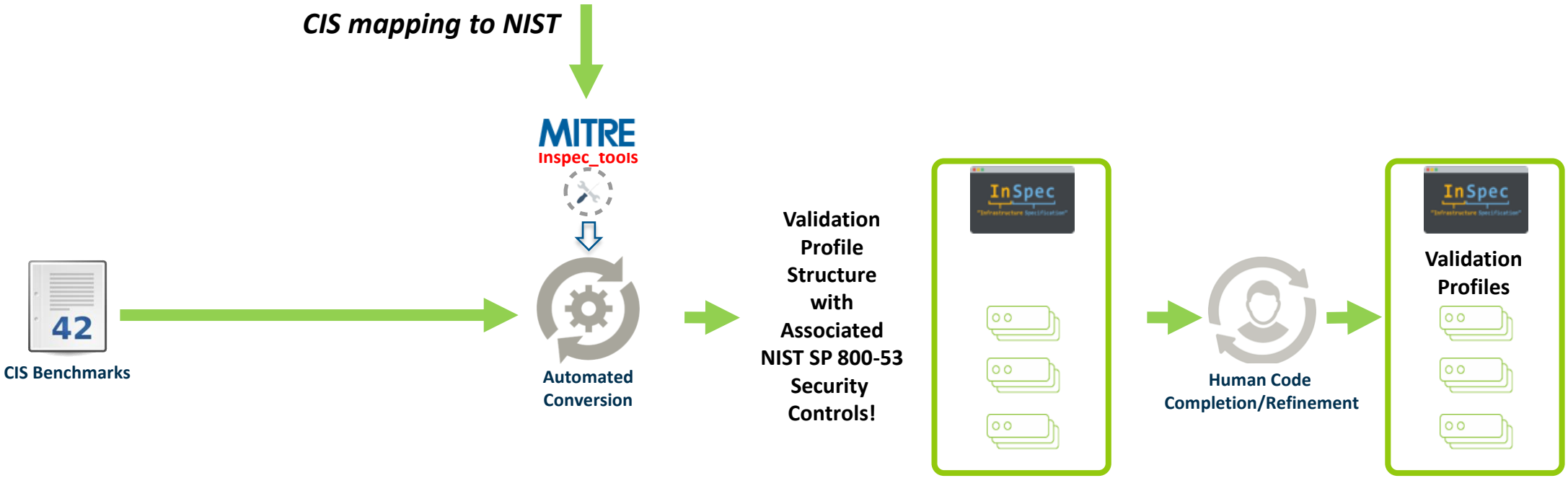
In InSpec_tools, we Mapped CIS Controls to NIST Controls

				The Center for Internet Security Critical Security Controls Version 6.1
NIST SP 800-53 Control #	NIST SP 800-53 Control Title	Family	Control	Control Description
CA-7	CONTINUOUS MONITORING	System	4.8	Establish a process to risk-rate vulnerabilities based on the exploitability and potential impact of the vulnerability, and segmented by appropriate groups of assets (example, DMZ servers, internal network servers, desktops, laptops). Apply patches for the riskiest vulnerabilities first. A phased rollout can be used to minimize the impact to the organization. Establish expected patching timelines based on the risk rating level.
AC-6	LEAST PRIVILEGE	Critical Security Control #5: Controlled Use of Administrative Privileges		
AC-6 (9)	LEAST PRIVILEGE | AUDITING USE OF PRIVILEGED FUNCTIONS	System	5.1	Minimize administrative privileges and only use administrative accounts when they are required. Implement focused auditing on the use of administrative privileged functions and monitor for anomalous behavior.
AC-6 (7)	LEAST PRIVILEGE | REVIEW OF USER PRIVILEGES	System	5.2	Use automated tools to inventory all administrative accounts and validate that each person with administrative privileges on desktops, laptops, and servers is authorized by a senior executive.
IA-5 (5)	AUTHENTICATOR MANAGEMENT | CHANGE AUTHENTICATORS PRIOR TO DELIVERY	System	5.3	Before deploying any new devices in a networked environment, change all default passwords for applications, operating systems, routers, firewalls, wireless access points, and other systems to have values consistent with administration-level accounts.
AC-2 (4)	ACCOUNT MANAGEMENT | AUTOMATED AUDIT ACTIONS	System	5.4	Configure systems to issue a log entry and alert when an account is added to or removed from a domain administrators' group, or when a new local administrator account is added on a system.
AU-2	AUDIT EVENTS	System	5.5	Configure systems to issue a log entry and alert on any unsuccessful login to an administrative account.
IA-2 (1)	IDENTIFICATION AND AUTHENTICATION | NETWORK ACCESS TO PRIVILEGED ACCOUNTS	System	5.6	Use multifactor authentication for all administrative access, including domain administrative access. Multi-factor authentication can include a variety of techniques, to include the use of smart cards,-certificates, One Time Password (OTP) tokens, biometrics, or other similar authentication methods.
IA-5 (1)	AUTHENTICATOR MANAGEMENT | PASSWORD-BASED AUTHENTICATION	System	5.7	Where multi-factor authentication is not supported, user accounts shall be required to use long passwords on the system (longer than 14 characters).
IA-5 (8)	AUTHENTICATOR MANAGEMENT | MULTIPLE INFORMATION SYSTEM ACCOUNTS	System	5.8	Administrators should be required to access a system using a fully logged and non-administrative account. Then, once logged on to the machine without administrative privileges, the administrator should transition to administrative privileges using tools

MITRE

MITRE's InSpec_tools Generates the CIS InSpec Profile Structure

https://github.com/mitre/inspec_tools/blob/master/lib/data/NIST_Map_09212017B_CSC-CIS_Critical_Security_Controls_VER_6.1_Excel_9.1.2016.xlsx



https://inspec-tools.mitre.org/

One of the AWS CIS Foundations Benchmark tests in InSpec Profile Code:

The unique CIS benchmark test number,

title,

CIS Control,

and associated
NIST SP 800-53 Security Control
are included in the InSpec profile structure!

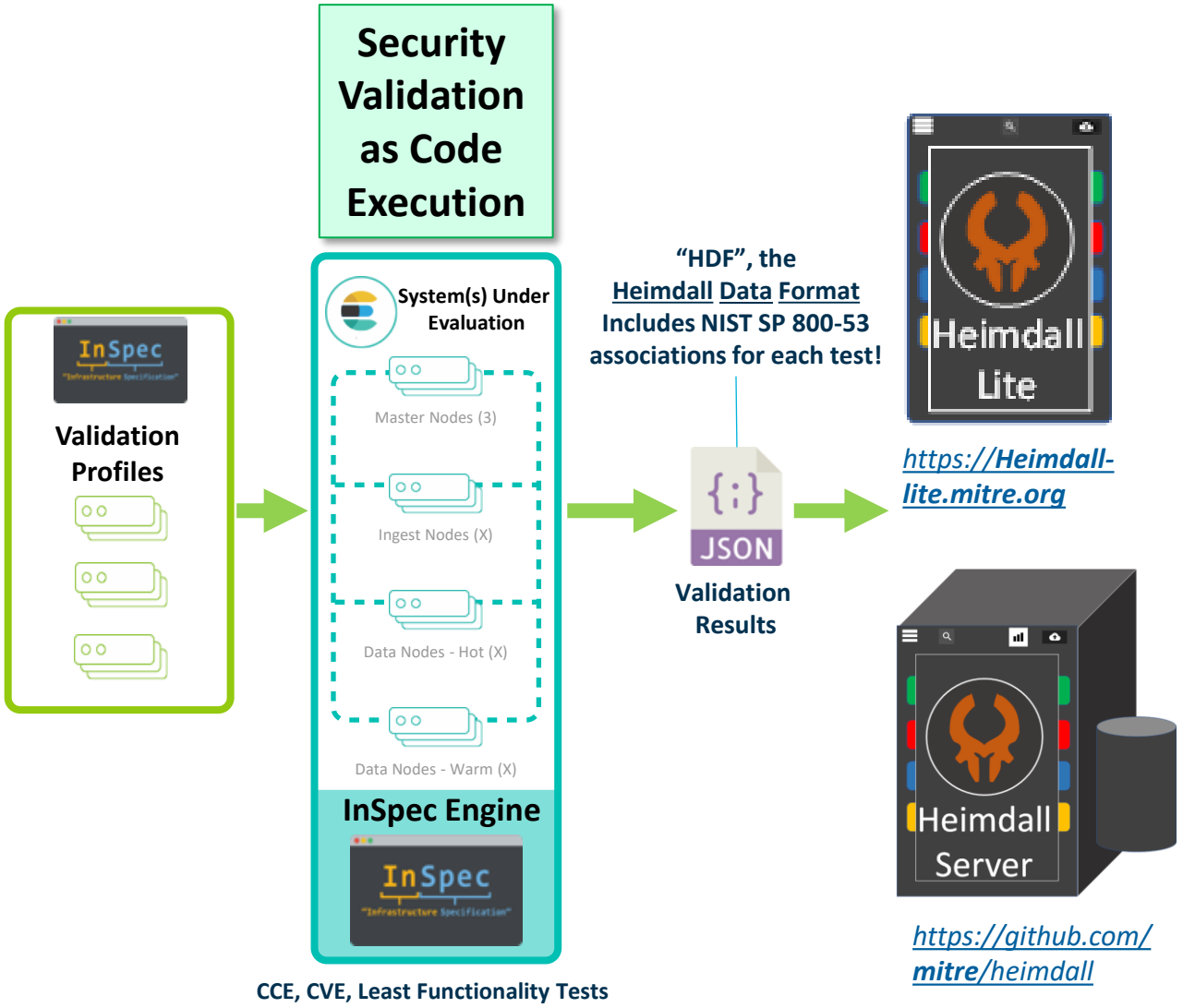
```
control 'cis-aws-foundations-1.9' do
  title "Ensure IAM password policy requires minimum length of #{pwd_length} or greater"
  desc  "Password policies are, in part, used to enforce password complexity
requirements. IAM password policies can be used to ensure password are at least
a given length. It is recommended that the password policy require a minimum
password length #{pwd_length}."
  impact 0.3
  tag "rationale": "Setting a password complexity policy increases account
resiliency against brute force login attempts."
  tag "cis_impact": ''
  tag "cis_rid": '1.9'
  tag "cis_level": 1
  tag "csc_control": [['5.7', '16.12'], '6.0']
  tag "nist": ['IA-5(1)', 'IA-2', 'Rev_4']
  tag "cce_id": 'CCE-78907-3'
  tag "check": "Perform the following to ensure the password policy is
configured as prescribed:

'Via AWS Console

* Login to AWS Console (with appropria
Management Account Settings)
* Go to IAM Service on the AWS Console
* Click on Account Settings on the Left Pane
* Ensure 'Minimum password length' is set to #{pwd_length} or greater.
```

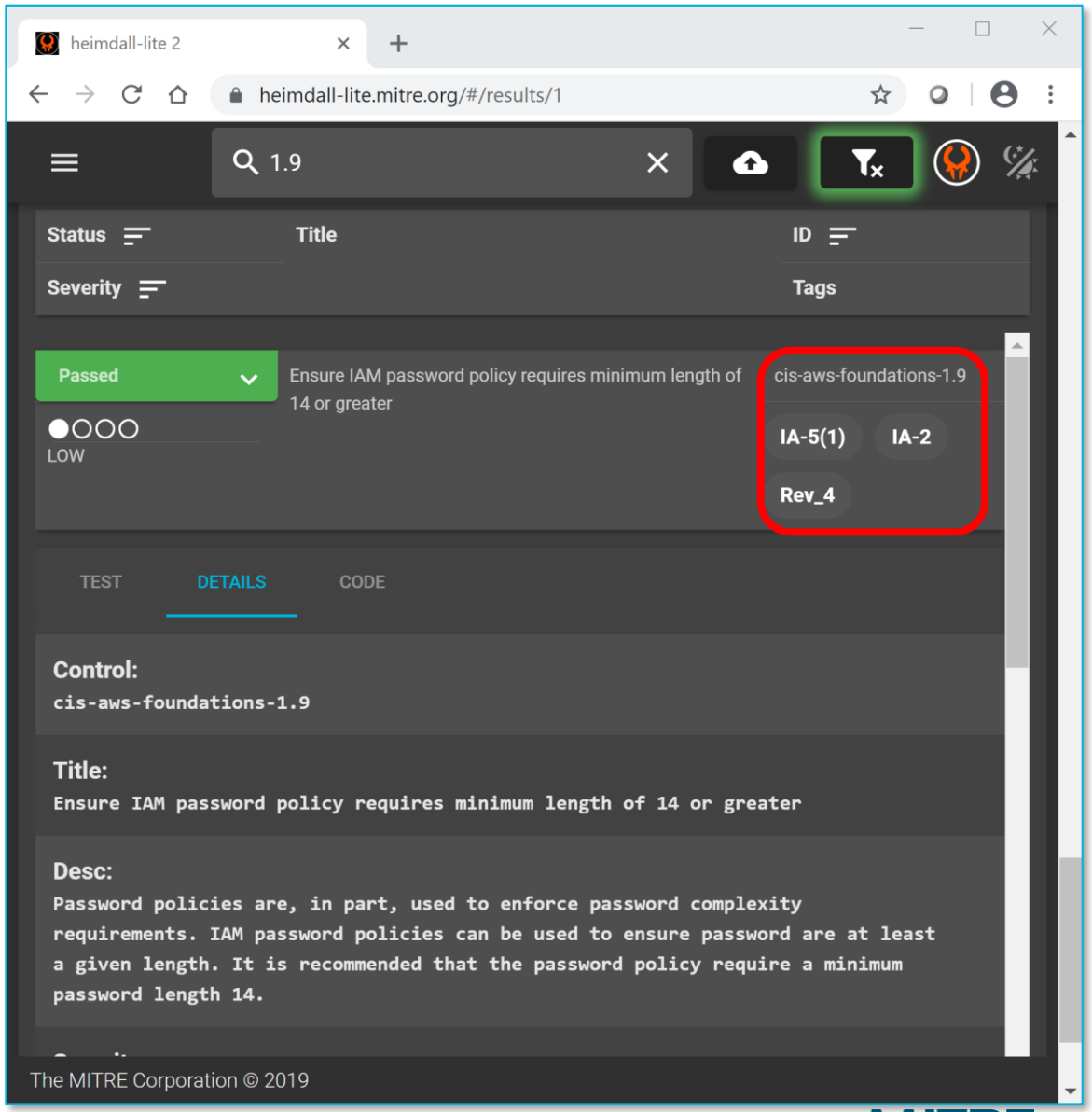
As well as all other original information from the CIS benchmark such as the check (CIS audit) and fix (CIS remediation) instructions

(https://github.com/mitre/cis-aws-foundations-baseline/blob/master/controls/cis-aws-foundations-1.9.rb)

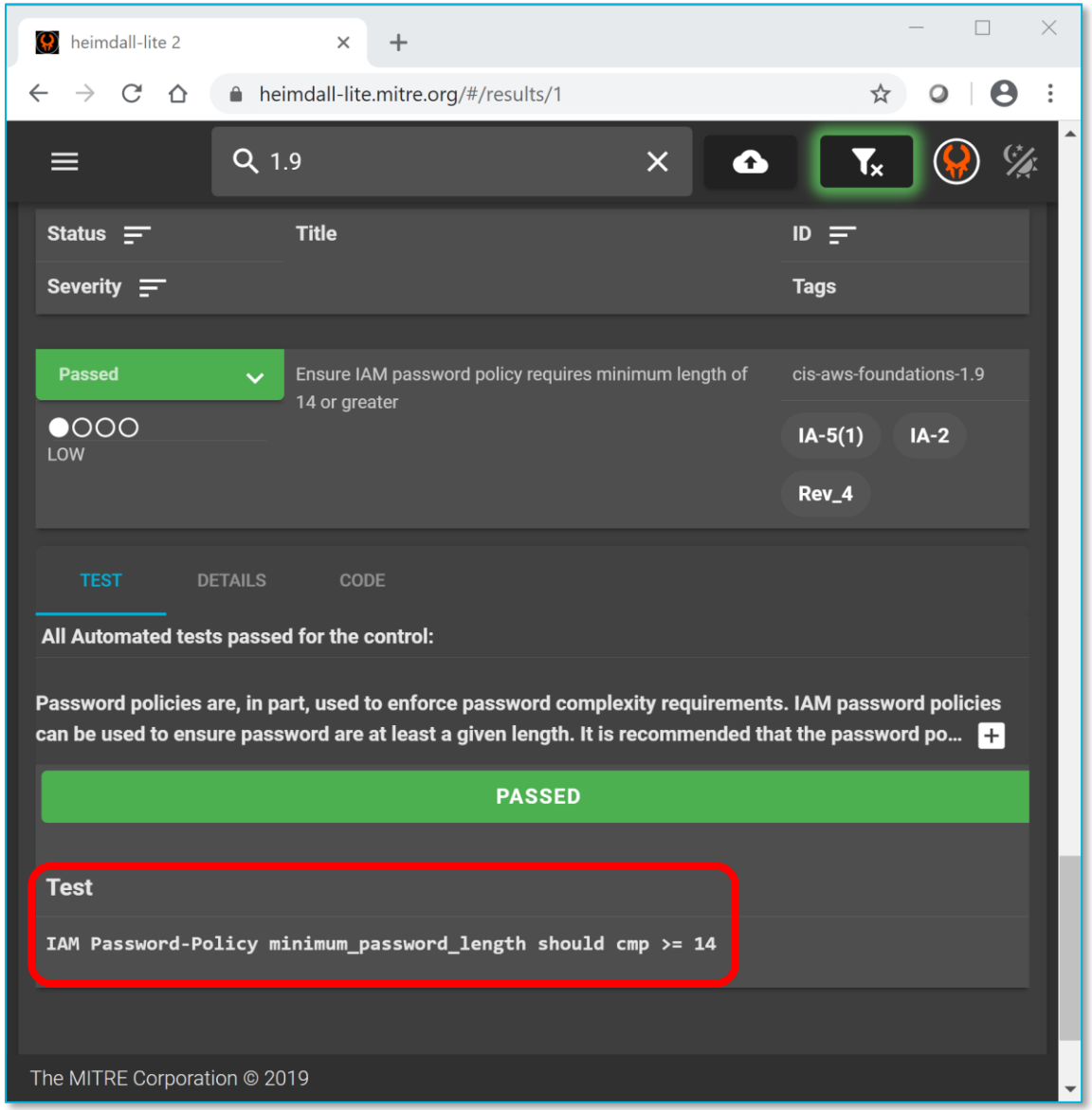
MITRE

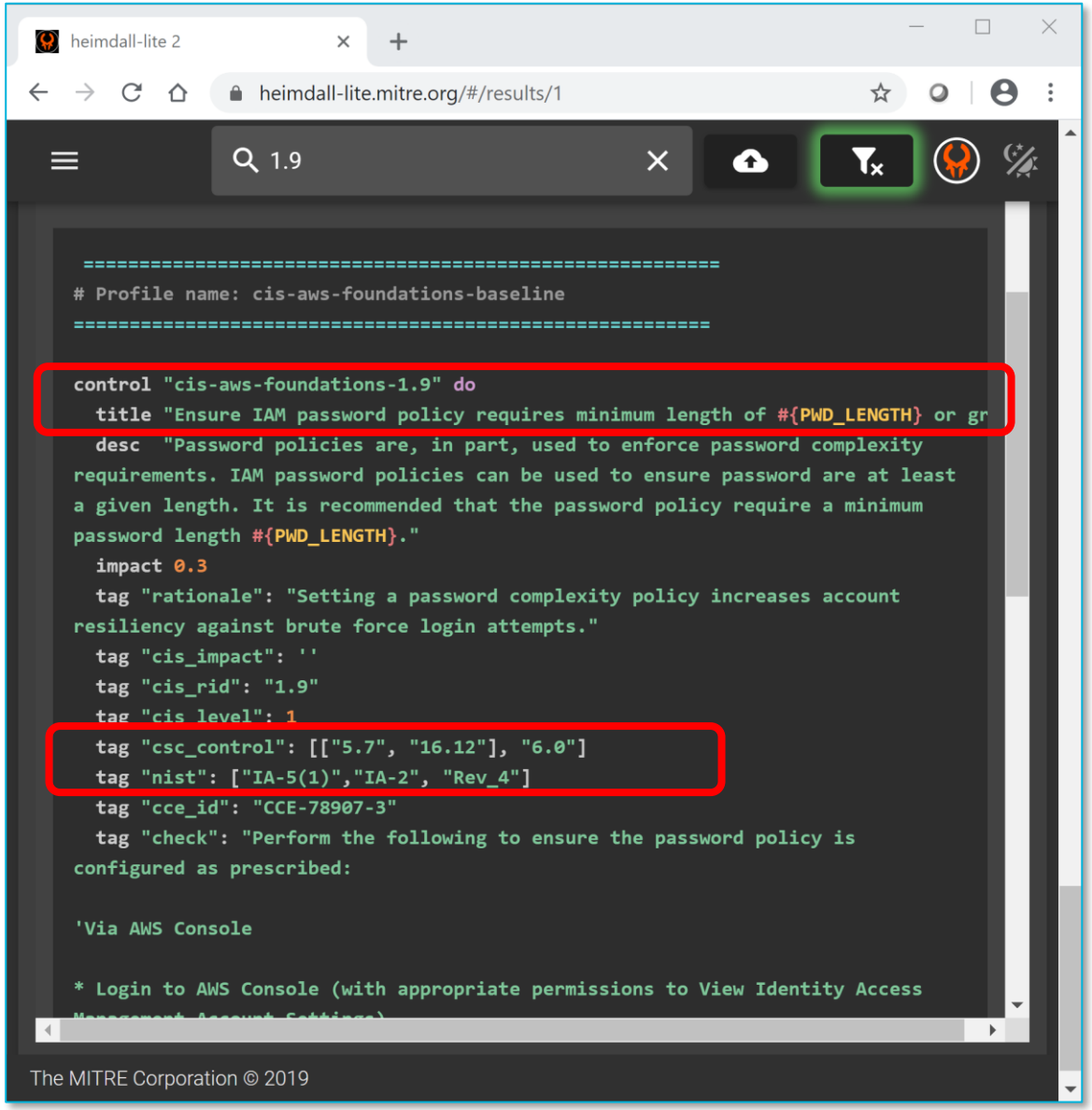
When CIS InSpec Profiles are run, test results and the InSpec code are included in the JSON validation results file, and viewable in MITRE's Heimdall





When CIS InSpec Profiles are run, test results and the InSpec code are included in the JSON validation results file, and viewable in MITRE's Heimdall





CIS InSpec Profile Validation Results JSON Heimdall Data Format (HDF) Sample:


```
{
    "id": "cis-aws-foundations-1.9",
    "title": "Ensure IAM password policy requires minimum length of 14 or greater",
    "desc": "Password policies are, in part, used to enforce password complexity\nrequirements. IAM password policies can be
    "descriptions": [
        {
            "label": "default",
            "data": "Password policies are, in part, used to enforce password complexity\nrequirements. IAM password policies
        }
    ],
    "impact": 0.3,
    "refs": [],
    "tags": {
        "rationale": "Setting a password complexity policy increases account\nresiliency against brute force login attempts.'
        "cis_impact": "",
        "cis_rid": "1.9",
        "cis_level": 1,
        "csc_control": [
            [
                "5.7",
                "16.12"
            ],
            "6.0"
        ],
        "nist": [
            "IA-5(1)",
            "IA-2",
            "Rev_4"
        ],
        "cce_id": "CCE-78907-3",
        "check": "Perform the following to ensure the password policy is\nconfigured as prescribed:\n\n'Via AWS Console\n\n*
        "fix": "Perform the following to set the password policy as prescribed:\n\n'Via AWS Console\n\n* Login to AWS Console
    },
    "code": "control \"cis-aws-foundations-1.9\" do\n  title \"Ensure IAM password policy requires minimum length of #{PWD_LE
    "source_location": {
        "line": 3,
        "ref": "./controls/cis-aws-foundations-1.9.rb"
    },
    "results": [
        {
            "status": "passed",
            "code_desc": "IAM Password-Policy minimum_password_length should cmp >= 14",
            "run_time": 0.000143,
            "start_time": "2018-11-18T20:21:40-05:00"
        }
    ]
},
```

Vendor Security Checklist

Use Case 3 of 3: Vendor Guidance to InSpec Profile (with NIST SP 800-53)

Some InSpec Profiles are based on Vendor Guidance, when neither STIGs nor CIS Benchmarks are available. For example:

CMS ARS 3.1:

CM-6 Configuration Settings (High, Moderate, Low) P1

Control:

The organization:

a. Establishes and documents configuration settings for information technology products employed within the information system using the latest security baseline configurations established by the HHS, U.S. Government Configuration Baselines (USGCB), and the National Checklist Program (NCP) defined by NIST SP 800-70 Rev. 2 (refer to Implementation Standard 1 for specifics) that reflect the most restrictive mode consistent with operational requirements;

b. Implements the configuration settings;

c. Identifies, documents, and approves any deviations from established configuration settings for individual components within the information system based on explicit operational requirements (defined in the applicable system security plan); and

d. Monitors and controls changes to the configuration settings in accordance with organizational policies and procedures.

Implementation Standards:

High, Moderate, & Low:

Std.1 - Use of HHS and CMS approved Operating System (OS)

(a) HHS-specific minimum security configurations must be used for the following OS and Applications:

1. HHS approved USGCB Windows Standards (e.g., Microsoft supported versions only); and
2. Blackberry Server - Websense.

(b) For all other OS's and applications, and to resolve configuration conflicts among multiple security guidelines, the CMS hierarchy for implementing security configuration guidelines is:

1. USGCB;
2. NIST NCP; Tier IV, then Tier III, Tier II, and Tier I, in descending order;
3. Defense Information Systems Agency (DISA) Security Technical Implementation Guides (STIG);
4. National Security Agency (NSA) STIGs;
5. If formal government-authored checklists do not exist, then organizations are encouraged to use vendor or industry group (such as The Center for Internet Security [CIS]) checklists.

CMS Acceptable Risk Safeguards (ARS)
Document Number: CMS_CIO-STD-SEC01-3.1

1st choice: STIG, but none available for RSA Archer
2nd choice: CIS, but none available for RSA Archer
3rd choice: Vendor checklist/guidance – which RSA has!

Example items to be tested with InSpec Profile

RSA ARCHER® SUITE

Security Configuration Guide

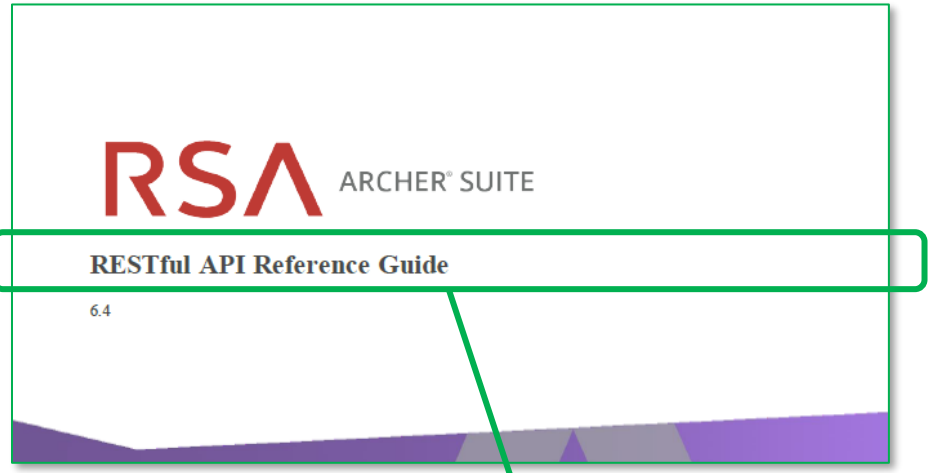
6.4

The following table shows the default security parameters settings for password strength.

Parameter	Setting
Minimum password length	9 characters
Alpha characters required	2 characters
Numeric characters required	1 character
Special characters required	1 character
Uppercase characters required	1 character
Lowercase characters required	1 character
Password change interval	90 days
Previous passwords disallowed	20 passwords
Grace logons	0 logon
Maximum failed logon attempts	3 attempts
Session time-out	10 minutes (sysadmin account) 10 minutes (user account) 30 minutes (service account)
Account lockout period	999 days

12 individual tests

Identifying Transport(s) & targets within component to query for tests



Get all security parameters

The Get all security parameters resource retrieves all security parameters for the current RSA Archer instance.

Request

POST http://RsaArcher/api/core/system/securityparameter

Request Header

Accept: application/json,text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Authorization: Archer session-id="*SessionToken"
Content-Type: application/json
X-Http-Method-Override: GET


```
{
...
...
"Name":"Test Security Param",
"Description":"test sec",
"MinPasswordLength":9,
"AlphaCharsRequired":2,
"NumericCharsRequired":1,
"UppercaseCharsRequired":1,
"LowercaseCharsRequired":1,
"SpecialCharsRequired":1,
"PasswordChangeInterval":90,
"GraceLogins":0,
"MaximumFailedLoginAttempts":3,
"PreviousPasswordsDisallowed":20,
"LockoutPeriod":999,
"SessionTimeout":10,
...
....
}
```


(API Response example)

The following table shows the default security para

Parameter	Setting
Minimum password length	9 characters
Alpha characters required	2 characters
Numeric characters required	1 character
Special characters required	1 character
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Lowercase characters required	1 character
Password change interval	90 days
Previous passwords disallowed	20 passwords
Grace logons	0 logon
Maximum failed logon attempts	3 attempts
Session time-out	10 minutes (sys 10 minutes (use 30 minutes (ser
Account lockout period	999 days

Defining Default title, description, check text, fix text, NIST SP 800-53 control (use for baseline* InSpec Profile)

Rule/Test #	Title	Description	Check Text	Fix Text	NIST SP 800-53 Control
rsa-archer-1.1	Minimum Password Length	Passwords must be a minimum of 9 characters in length.	In security parameters, check if MinPasswordLength = 9	In security parameters, set MinPasswordLength = 9	IA-5(1)
rsa-archer-1.2	Alpha characters required	When passwords are changed or new passwords are established, the new password must contain at least two alpha characters.	In security parameters, check if AlphaCharsRequired = 2	In security parameters, set AlphaCharsRequired = 2	IA-5(1)
rsa-archer-1.3	Numeric characters required	When passwords are changed or new passwords are established, the new password must contain at least one numeric character.	In security parameters, check if NumericCharsRequired = 1	In security parameters, set NumericCharsRequired = 1	IA-5(1)
rsa-archer-1.4	Special characters required	When passwords are changed or new passwords are established, the new password must contain at least one special character.	In security parameters, check if SpecialCharsRequired = 1	In security parameters, set SpecialCharsRequired = 1	IA-5(1)
rsa-archer-1.5	Uppercase characters required	When passwords are changed or new passwords are established, the new password must contain at least one uppercase character.	In security parameters, check if	In security parameters, set = 1	IA-5(1)
rsa-archer-1.6	Lowercase characters require	When passwords are changed or new passwords are assigned, the new password must contain at least one lowercase character.		t = 1	IA-5(1)
rsa-archer-1.7	Password change interval	Existing passwords must be restricted to a 90-day maximum lifetime.		t = 90	IA-5(1)
rsa-archer-1.8	Previous passwords disallowed	Passwords must be prohibited from reuse for a minimum of 20 generations.	In security parameters, check if PreviousPasswordsDisallowed = 20	In security parameters, set PreviousPasswordsDisallowed = 20	IA-5(1)
rsa-archer-1.9	Grace logons	After password expiration, zero grace logons are permitted using the expired password.	In security parameters, check if GraceLogins = 0	In security parameters, set GraceLogins = 0	IA-5(1)
rsa-archer-1.10	Maximum failed logon attempts	Accounts subject to 3 unsuccessful logon attempts must be locked.	In security parameters, check if MaximumFailedLoginAttempts = 3	In security parameters, set MaximumFailedLoginAttempts = 3	AC-7
rsa-archer-1.11	Session time-out	The operating system must initiate a session time-out after a 10 minute period of inactivity	In security parameters, check if SessionTimeout = 10	In security parameters, set SessionTimeout = 10	AC-11
rsa-archer-1.12	Account lockout period	Accounts locked due to unsuccessful logon attempts will stay locked until unlocked by an administrator.	In security parameters, check if LockoutPeriod = 999	In security parameters, set LockoutPeriod = 999	AC-7

Associated NIST SP 800-53 Security Controls are identified based on experienced security assessors familiar with the context of the tests.

** https://github.com/mitre/rsa-archer-6-security-configuration-guide-baseline*

Example of an InSpec Profile test based on Vendor Guidance

Unique test number,

title,

and associated NIST SP 800-53 Security Control are included in the InSpec profile structure!

```
control 'rsa-archer-1.1' do
  title 'Minimum Password Length'
  desc 'Passwords must be a minimum of 9 characters in length.'
  impact 'medium'
  desc 'check', 'In security parameters, check if MinPasswordLength = 9.'
  desc 'fix', 'In security parameters, set MinPasswordLength = 9.'
  tag 'nist': ['IA-5(1)', 'Rev_4']

  archer_api_helper = archer(url: attribute('url'),
                             instancename: attribute('instancename'),
                             user_domain: attribute('user_domain'),
                             username: attribute('username'),
                             password: attribute('password'),
                             ssl_verify: attribute('ssl_verify'))

  describe archer_api_helper do
    its('default_administrative_user.MinPasswordLength') { should cmp >= attribute('minimum_password_length') }
    its('general_user_parameter.MinPasswordLength') { should cmp >= attribute('minimum_password_length') }
    its('archer_services_parameter.MinPasswordLength') { should cmp >= attribute('minimum_password_length') }
  end
end
```

(https://github.com/mitre/rsa-archer-6-security-configuration-guide-baseline/blob/master/controls/rsa-archer-1.1.rb)

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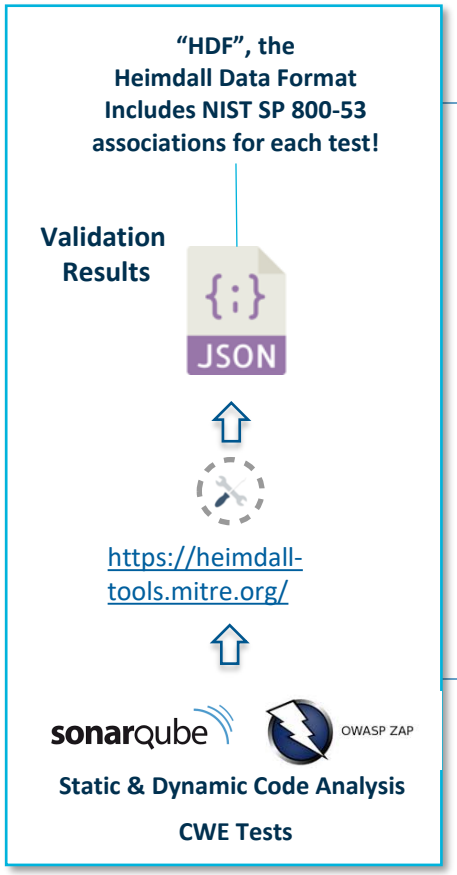
CMS ARS 3.1 title, description, check text, fix text, NIST SP 800-53 control (use for CMS overlay* InSpec Profile)

Rule/Test #	Title	Description	Check Text	Fix Text	NIST SP 800-53 Control
rsa-archer-1.1	Minimum Password Length	Passwords must be a minimum of 15 characters in length.	In security parameters, check if MinPasswordLength = 15	In security parameters, set MinPasswordLength = 15	IA-5(1)
rsa-archer-1.2	Alpha characters required	When passwords are changed or new passwords are established, the new password must contain at least one alpha characters.	In security parameters, check if AlphaCharsRequired = 1	In security parameters, set AlphaCharsRequired = 1	IA-5(1)
rsa-archer-1.3	Numeric characters required	When passwords are changed or new passwords are established, the new password must contain at least one numeric character.	In security parameters, check if NumericCharsRequired = 1	In security parameters, set NumericCharsRequired = 1	IA-5(1)
rsa-archer-1.4	Special characters required	When passwords are changed or new passwords are established, the new password must contain at least one special character.	In security parameters, check if SpecialCharsRequired = 1	In security parameters, set SpecialCharsRequired = 1	IA-5(1)
rsa-archer-1.5	Uppercase characters required	When passwords are changed or new passwords are established, the new password must contain at least one uppercase character.	In security parameters, check if UppercaseCharsRequired = 1	In security parameters, set UppercaseCharsRequired = 1	IA-5(1)
rsa-archer-1.6	Lowercase characters require	When passwords are changed or new passwords are assigned, the new password must contain at least one lowercase character.	In security parameters, check if LowercaseCharsRequired = 1	In security parameters, set LowercaseCharsRequired = 1	IA-5(1)
rsa-archer-1.7	Password change interval	Existing passwords must be restricted to a 60-day maximum lifetime.	In security parameters, check if PasswordChangeInterval = 60	In security parameters, set PasswordChangeInterval = 60	IA-5(1)
rsa-archer-1.8	Previous passwords disallowed	Passwords must be prohibited from reuse for a minimum of 12 generations.	In security parameters, check if PreviousPasswordsDisallowed = 12	In security parameters, set PreviousPasswordsDisallowed = 12	IA-5(1)
rsa-archer-1.9	Grace logons	After password expiration, zero grace logons are permitted using the expired password.	In security parameters, check if GraceLogins = 0	In security parameters, set GraceLogins = 0	IA-5(1)
rsa-archer-1.10	Maximum failed logon attempts	Accounts subject to 3 unsuccessful logon attempts must be locked.	In security parameters, check if MaximumFailedLoginAttempts = 3	In security parameters, set MaximumFailedLoginAttempts = 3	AC-7
rsa-archer-1.11	Session time-out	The operating system must initiate a session time-out after a 15 minute period of inactivity	In security parameters, check if SessionTimeout = 15	In security parameters, set SessionTimeout = 15	AC-11
rsa-archer-1.12	Account lockout period	Accounts locked due to unsuccessful logon attempts will stay locked until unlocked by an administrator.	In security parameters, check if LockoutPeriod = 999	In security parameters, set LockoutPeriod = 999	AC-7

* https://github.com/CMSgov/cms-ars-3.1-high-rsa-archer-6-security-configuration-guide-overlay

Non-InSpec Use Case:
Using Heimdall_tools to Convert Other Security Data to Heimdall Data Format (HDF) (with NIST SP 800-53 associations)



Many Security Tools use other associations for their test results.

Heimdall_tools takes the native format, converts to Heimdall Data Format, and maps the native association to the NIST SP 800-53 Security Controls:

11 lines (11 sloc) | 639 Bytes — Raw | Blame | History

OWASP-ID	OWASP Name	NIST-ID	Rev	NIST Name
A1	Injection	SI-10	4	Information Input Validation
A2	Broken Authentication	SC-23	4	Session Authenticity
A3	Sensitive Data Exposure	SI-11	4	Error Handling
A4	XML External Entities (XXE)	SI-10	4	Information Input Validation
A5	Broken Access Control	AC-3	4	Access Enforcement
A6	Security Misconfiguration	CM-6	4	Configuration Settings
A7	Cross-Site Scripting (XSS)	SI-10	4	Information Input Validation
A8	Insecure Deserialization	SC-23	4	Session Authenticity
A9	Using Components with Known Vulnerabilities	SI-2	4	Flaw Remediation
A10	Insufficient Logging&Monitoring	AU-12	4	Audit Generation

https://github.com/mitre/heimdall_tools/blob/master/lib/data/owasp-nist-mapping.csv

195 lines (195 sloc) | 14 KB — Raw | Blame | History

CWE-ID	CWE Name	NIST-ID	Rev	NIST Name
5	J2EE Misconfiguration: Data Transmission Without Encryption	SC-8	4	Transmission Confidentiality and Integrity
6	J2EE Misconfiguration: Insufficient Session-ID Length	SC-23	4	Session Authenticity
7	J2EE Misconfiguration: Missing Custom Error Page	SI-11	4	Error Handling
8	J2EE Misconfiguration: Entity Bean Declared Remote	AC-3	4	Access Enforcement
9	J2EE Misconfiguration: Weak Access Permissions for EJB Methods	AC-3	4	Access Enforcement
11	ASP.NET Misconfiguration: Creating Debug Binary	SI-11	4	Error Handling
14	Compiler Removal of Code to Clear Buffers	SI-16	4	Memory Protection
15	External Control of System or Configuration Setting	SI-10	4	Information Input Validation
20	Improper Input Validation	SI-10	4	Information Input Validation
22	Improper Limitation of a Pathname to a Restricted Directory ('Path Traversal')	SI-10	4	Information Input Validation

https://github.com/mitre/heimdall_tools/blob/master/lib/data/cwe-nist-mapping.csv

sonarqube

OWASP ZAP

Native Association

CWE
(Common Weakness Enumeration)
https://cwe.mitre.org/

OWASP Top 10
https://owasp.org/www-project-top-ten/

MITRE
Heimdall_tools

Automated Conversion
https://heimdall-tools.mitre.org/

"HDF", the Heimdall Data Format Includes NIST SP 800-53 associations for each test!

JSON
Validation Results

Heimdall Lite
https://**Heimdall-lite.mitre.org**

Heimdall Server
https://github.com/**mitre**/heimdall

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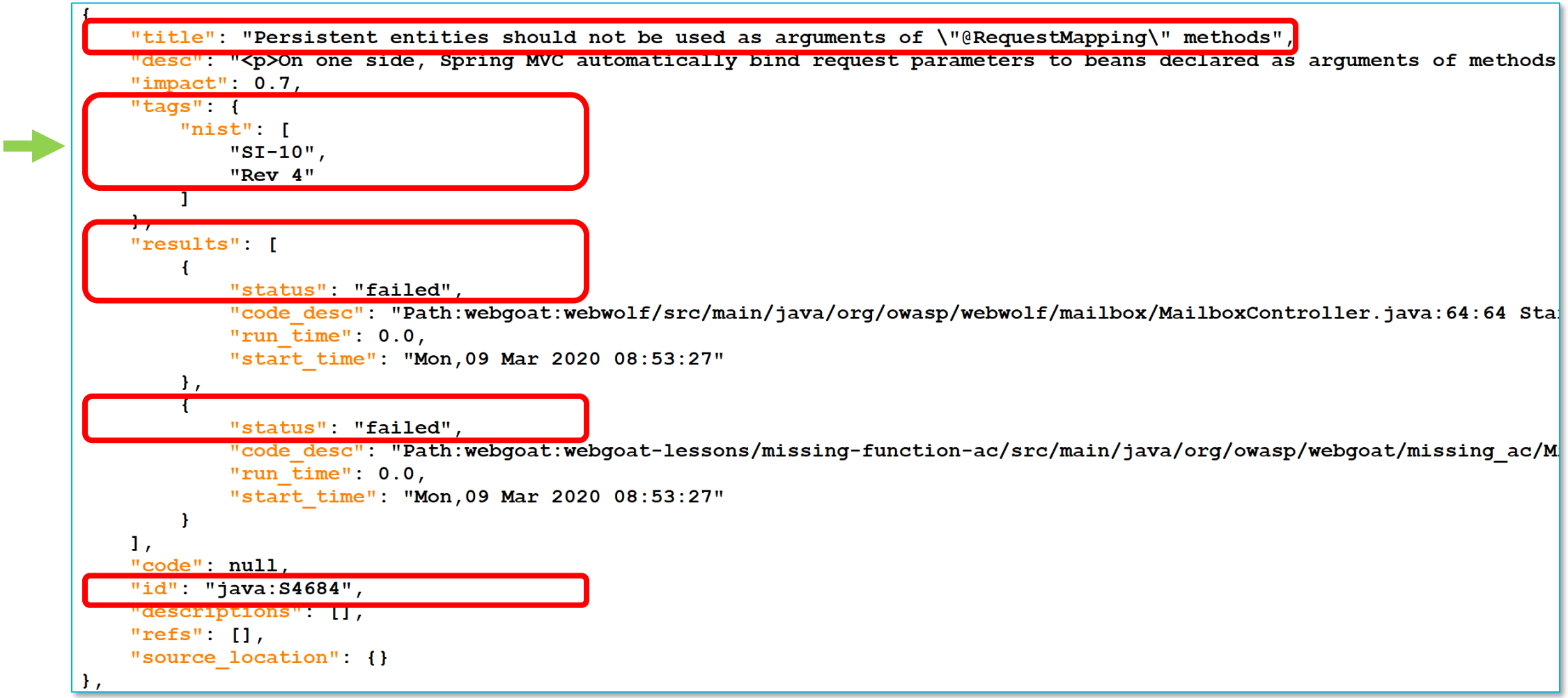
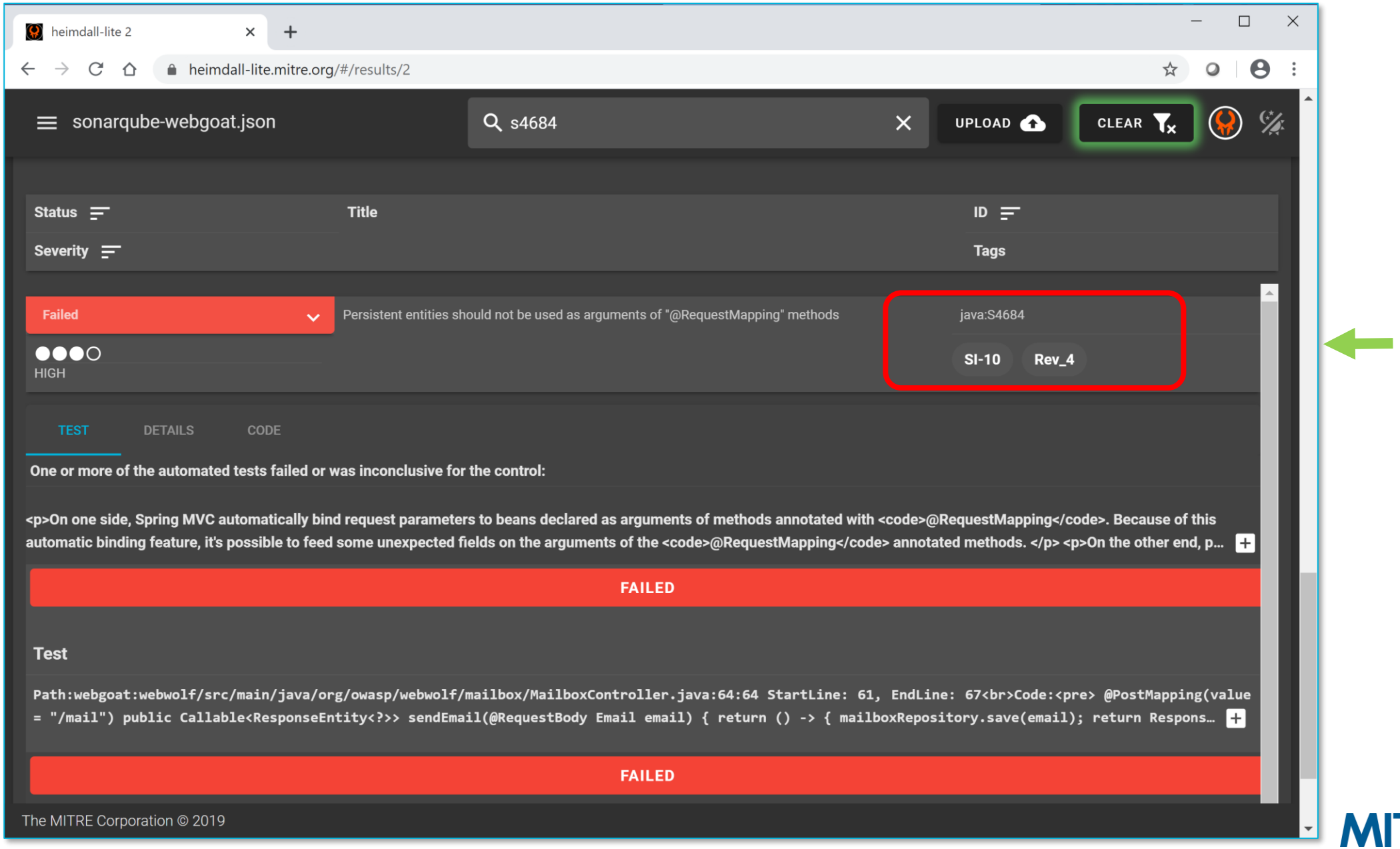
Sample SonarQube output in Heimdall Data Format (HDF), including NIST tag:




```
{
    "title": "Persistent entities should not be used as arguments of \"@RequestMapping\" methods",
    "desc": "<p>On one side, Spring MVC automatically bind request parameters to beans declared as arguments of methods
    "impact": 0.7,
    "tags": {
        "nist": [
            "SI-10",
            "Rev 4"
        ]
    },
    "results": [
        {
            "status": "failed",
            "code_desc": "Path:webgoat:webwolf/src/main/java/org/owasp/webwolf/mailbox/MailboxController.java:64:64 Sta
            "run_time": 0.0,
            "start_time": "Mon,09 Mar 2020 08:53:27"
        },
        {
            "status": "failed",
            "code_desc": "Path:webgoat:webgoat-lessons/missing-function-ac/src/main/java/org/owasp/webgoat/missing_ac/M
            "run_time": 0.0,
            "start_time": "Mon,09 Mar 2020 08:53:27"
        }
    ],
    "code": null,
    "id": "java:S4684",
    "descriptions": [],
    "refs": [],
    "source_location": {}
},
```

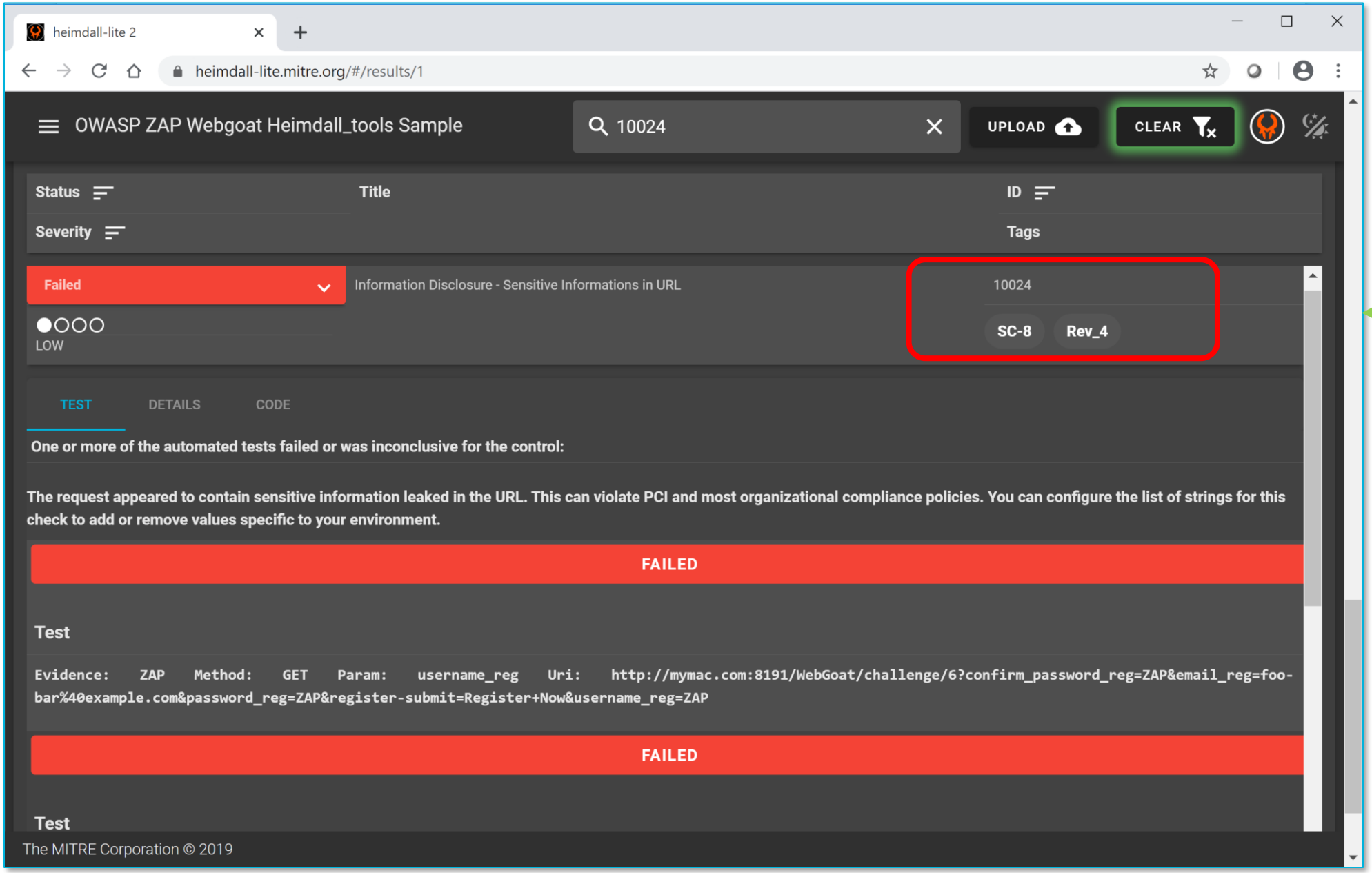
Sample SonarQube output in Heimdall Data Format (HDF), viewed in Heimdall:



Sample OWASP ZAP output in Heimdall Data Format (HDF), including NIST tag:

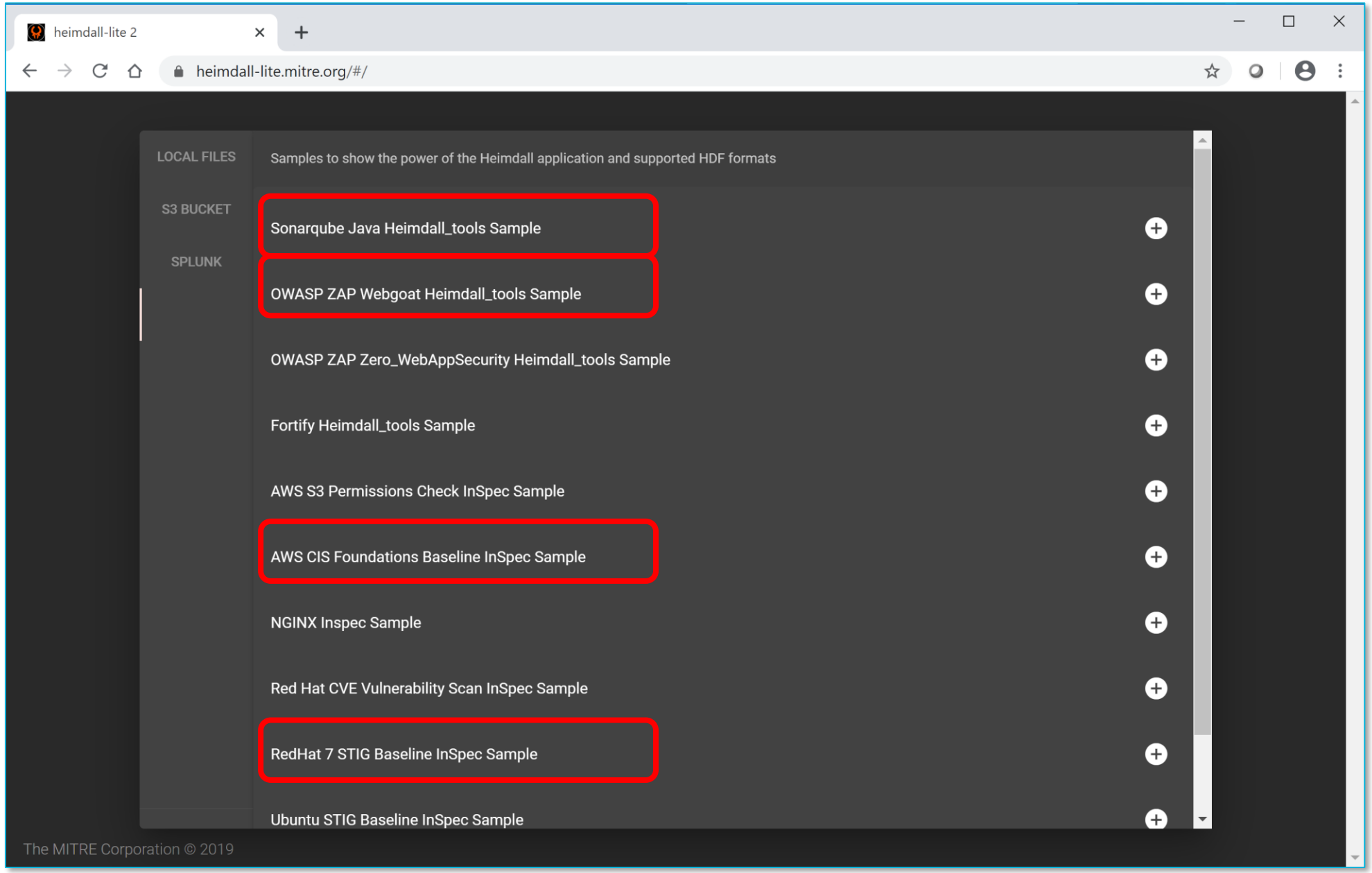

```
    "id": "10024",
    "title": "Information Disclosure - Sensitive Informations in URL",
    "desc": "The request appeared to contain sensitive information leaked in the URL. This can violate PCI and most organizational compliance policies. You can configure
    "impact": 0.3,
    "tags": {
        "nist": [
            "SC-8",
            "Rev_4"
        ],
        "cweid": "200",
        "wascid": "13",
        "sourceid": "3",
        "confidence": "2",
        "riskdesc": "Informational (Medium)",
        "check": "<p>Do not pass sensitive information in URIs.</p>\n<p>The URL contains potentially sensitive information.</p>\n<p>The URL contains potentially sensitive
    },
    "descriptions": [],
    "refs": [],
    "source_location": {},
    "code": "",
    "results": [
        {
            "status": "failed",
            "code_desc": "Evidence: ZAP\nMethod: GET\nParam: username_reg\nUri: http://mymac.com:8191/WebGoat/challenge/6?confirm_password_reg=ZAP&email_reg=foo-bar%40exa
            "run_time": 0.0,
            "start_time": "Thu, 6 Dec 2018 10:53:11"
        },
        {
            "status": "failed",
            "code_desc": "Evidence: ZAP\nMethod: GET\nParam: confirm_password_reg\nUri: http://mymac.com:8191/WebGoat/challenge/6?confirm_password_reg=ZAP&email_reg=foo-b
            "run_time": 0.0,
            "start_time": "Thu, 6 Dec 2018 10:53:11"
        },
        {
            "status": "failed",
            "code_desc": "Evidence: foo-bar@example.com\nMethod: GET\nParam: email_reg\nUri: http://mymac.com:8191/WebGoat/challenge/6?confirm_password_reg=ZAP&email_reg=
            "run_time": 0.0,
            "start_time": "Thu, 6 Dec 2018 10:53:11"
        },
        {
            "status": "failed",
            "code_desc": "Evidence: Guest\nMethod: GET\nParam: user\nUri: http://mymac.com:8191/WebGoat/JWT/votings/login?user=Guest\n",
            "run_time": 0.0,
            "start_time": "Thu, 6 Dec 2018 10:53:11"
        },
        {
            "status": "failed",
            "code_desc": "Evidence: ZAP\nMethod: GET\nParam: password_reg\nUri: http://mymac.com:8191/WebGoat/challenge/6?confirm_password_reg=ZAP&email_reg=foo-bar%40exa
            "run_time": 0.0,
            "start_time": "Thu, 6 Dec 2018 10:53:11"
        }
    ]
},
```

Sample OWASP ZAP output in Heimdall Data Format (HDF), viewed in Heimdall:



Samples Available in Heimdall-Lite

Samples available in Heimdall Lite at https://heimdall-lite.mitre.org/:



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