

SWAMP-in-a-Box Administrator Manual

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1. Introduction

1.1. What Is SWAMP

The Software Assurance Marketplace (SWAMP) is a platform for running software assurance tools on your code. It is a joint effort of four research institutions — the Morgridge Institute for Research, Indiana University, the University of Illinois at Urbana-Champaign, and the University of Wisconsin-Madison — to advance the capabilities and increase the adoption of software assurance technologies through an open continuous assurance facility. The SWAMP originally went live in February 2014 as a web application at <https://www.mir-swamp.org>, where it provides continuous software assurance capabilities to developers and researchers.

The SWAMP is funded by the Department of Homeland Security (DHS) Science and Technology Directorate, Homeland Security Advanced Research Projects Agency, Cyber Security Division (DHS S&T/HSARPA/CSD); BAA 11-02; and Air Force Research Laboratory, Information Directorate under agreement number FA8750-12-2-0289.

1.2. What Is SWAMP-in-a-Box

For users that need or prefer to run software assurance tools on their own computing infrastructure, the SWAMP project offers a standalone software application called SWAMP-in-a-Box (SiB). It is, in essence, a local instance of the SWAMP that can be deployed on your own servers if you have higher security or compliance requirements for your software, or, being open-source, when you want to customize the software.

1.3. Obtaining SWAMP-in-a-Box

SWAMP-in-a-Box is currently available as an open beta. Visit <https://github.com/mirswamp/deployment> for instructions on how to download SWAMP-in-a-Box as a pre-packaged installer or as source code.

1.4. Documentation for SWAMP-in-a-Box

Copies of this SWAMP-in-a-Box Administrator Manual and the SWAMP-in-a-Box Reference Manual can be found in `/opt/swamp/doc` on the SWAMP-in-a-Box host after SWAMP-in-a-Box has been installed. Each manual is available as a single page HTML document and as a PDF. The [AsciiDoc](#) sources for the manuals are also available in the `administrator_manual` and `reference_manual` sub-directories.

2. System Requirements

SWAMP-in-a-Box is designed to be installed on a dedicated host, one that is not providing other services — including Apache HTTP Server, MySQL/MariaDB, and HTCondor.

2.1. Hardware Requirements

Minimum:

- Memory: 16G
- Disk: 256G
- Cores: 4
- Support for [KVM](#) virtualization

Recommended:

- Memory: 64G
- Disk: 1T
- Cores: 8
- Support for [KVM](#) virtualization

SWAMP-in-a-Box uses virtual machines managed by an HTCondor pool to perform assessments of packages and to run the optional Code Dx results viewer from Code Dx, Inc. Each virtual machine is provisioned with 6G of RAM and 2 cores, and HTCondor will do its best not to over-allocate the host's resources. Thus, the host's available memory and cores determines the number of simultaneous assessments that may be performed. The minimum requirements are intended to allow the host to run two virtual machines simultaneously while leaving resources available to run the web server and database that together provide the SWAMP web application to users.

If you are installing SWAMP-in-a-Box on physical hardware, modern x86-family processors provide support for KVM via Intel's VT-x or AMD's AMD-V extensions. On some systems, it might be necessary to enable Intel Virtual Technology extensions in the BIOS.

If you are installing SWAMP-in-a-Box in a virtual machine, the hypervisor must support and be configured for nested virtualization. For example, when using a VMware product as the hypervisor for the SWAMP-in-a-Box virtual machine, it might be necessary to enable a setting such as "Expose hardware-assisted virtualization to the guest operating system" or "Virtualize Intel VT-x/EPT or AMD-V/RVI."

2.2. Supported Operating Systems

CentOS 6 and 7 are both supported. Other similar Linux distributions, such as Red Hat Enterprise Linux, might work but are untested.

2.3. Supported Disk Partitioning Schemes

As much space as possible should be allocated to the `/` partition without deleting or shrinking required system partitions, e.g., `/boot` and `swap`. For example, if there is a separate partition for `/home`, delete it, and allocate the space to the `/` partition.

2.4. Disable SELinux

SWAMP-in-a-Box will not install or function correctly when SELinux is in **enforcing** mode, in part because the various software packages that SWAMP-in-a-Box relies on do not all support SELinux.

To disable SELinux, edit the file `/etc/selinux/config` on the host by changing the line `SELINUX=enforcing` to `SELINUX=disabled`. (You will need **root** access to edit this file.) Then reboot the host.

2.5. Create a User Account with Full **sudo** Privileges

We recommend creating a normal user account with full **sudo** privileges so that the SWAMP-in-a-Box host can be administered without being logged in as **root** all the time. To create such an account:

1. Log in as **root**.
2. Create the new user account (replace `<username>` with the name of the new account):

```
useradd <username>
```

3. Set the new account's password:

```
passwd <username>
```

4. Run **visudo**, which will let you edit the `sudoers` file in the **vi** text editor. Find the line similar to

```
root ALL=(ALL) ALL
```

Add below it

```
<username> ALL=(ALL) ALL
```

Whenever a task requires **root** access to the SWAMP-in-a-Box host, it can be run while logged in as the user created above by prefixing the relevant commands with **sudo**. For example, to use the **vi** text editor to edit `/opt/swamp/etc/swamp.conf` as **root**:

```
sudo vi /opt/swamp/etc/swamp.conf
```

2.6. Configure Firewalls

With regards to network traffic, the SWAMP-in-a-Box host is expected to:

- Respond to incoming HTTPS (port 443) network traffic, because it is required to access the SWAMP web application and for the web application to function correctly.
- Potentially generate outgoing traffic while performing an assessment of a package, typically using HTTP, HTTPS, FTP, FTPS, SSH, and rsync. Traffic can include updating of the platform's currently installed set of packages ([this can be disabled](#), if desired) and downloading of user-specified dependencies for the package being assessed. The package's build system might also require access to the internet.

Any firewalls protecting the SWAMP-in-a-Box host must be configured to allow the above network traffic. The SWAMP-in-a-Box installer will not modify the host's firewall configuration.

Restart the `libvirtd` service on the host whenever the host's firewall configuration is modified. To do so, as `root` (or using `sudo`), run the following command:



```
service libvirtd restart
```

This is necessary because the `libvirtd` service modifies the host's firewall configuration in order to allow the virtual machines started by it to access the host's network, but it does not make its configuration changes permanent.

Example 1. Allowing Incoming HTTPS and SSH Traffic with iptables

For systems that use `iptables`, such as CentOS 6 by default, a sample configuration file can be found in the `config_templates` sub-directory of the SWAMP-in-a-Box installer (referred to below as `<installer-dir>`). Copy the `iptables` file from that directory to `/etc/sysconfig`. Then restart the `iptables` and `libvirtd` services. For example, as `root` (or using `sudo`), run the following commands:

```
cp <installer-dir>/config_templates/iptables /etc/sysconfig
service iptables restart
service libvirtd restart
```

Example 2. Allowing Incoming HTTPS and SSH Traffic with firewalld

For systems that use `firewalld`, such as CentOS 7 by default, use `firewall-cmd` to permanently allow HTTPS and SSH traffic. Then restart the `firewalld` and `libvirtd` services. For example, as `root` (or using `sudo`), run the following commands:

```
firewall-cmd --zone=public --permanent --add-service=https
firewall-cmd --zone=public --permanent --add-service=ssh
systemctl restart firewalld
systemctl restart libvirtd
```

2.7. Other Considerations

The SWAMP-in-a-Box install/upgrade process and supporting utilities configure only those aspects of the host that are directly involved in ensuring that the SWAMP functions correctly. Other aspects are the responsibility of the host's system administrator. For example, the administrator might consider looking at the Applied Crypto Hardening guide at <https://bettercrypto.org> for suggestions on how to configure the SSH server and other cryptographic tools on the host.

3. Installing and Upgrading SWAMP-in-a-Box

This section goes through the steps involved in installing a new SWAMP-in-a-Box and upgrading an existing SWAMP-in-a-Box.

3.1. Before You Begin

3.1.1. Before Installing a New SWAMP-in-a-Box

- You will need `root` access to the SWAMP-in-a-Box host.
- The install script will prompt for the DNS hostname to use for the host. It must match the hostname that users will use to access the SWAMP web application and the hostname on the [SSL certificates](#) for the host's web server.
- The install script will prompt for the initial values to use for the following passwords, which can then be used to access the SWAMP web application and database that are installed as part of SWAMP-in-a-Box:
 - Database `root` password: SWAMP-in-a-Box uses MariaDB as its database backend. This is the password for the database's `root` user. It may be different from the host operating system's `root` user's password (the database maintains a separate collection of user accounts for accessing it).



Do not forget this password. It is required to upgrade SWAMP-in-a-Box and reset the passwords below.

- Database web password: This is the password used by the SWAMP web application's backend to connect to the database.
- Database SWAMP services password: This is the password used by SWAMP-in-a-Box's system daemons and backend processes to connect to the database.
- SWAMP administrator account password: This is the password for the SWAMP web application's `admin-s` account, which is created during the install process and can be used to administer the SWAMP.

3.1.2. Before Upgrading an Existing SWAMP-in-a-Box

- You will need `root` access to the SWAMP-in-a-Box host.
- You will need `root` access to the SWAMP-in-a-Box database.

- The SWAMP-in-a-Box host must currently have version 1.29 or later of SWAMP-in-a-Box installed. Upgrades from earlier versions are not supported and will likely result in a non-working system. Older systems should be upgraded to 1.29 or 1.30 first, before upgrading them to a more recent version.

3.2. Run `yum update`

We recommend running `yum update` (as `root` or using `sudo`) to ensure that any software installed on the SWAMP-in-a-Box host is up-to-date. This is especially important when there has been a new release of the host's operating system since the host was initially set up, in which case the steps below would likely cause a partial update to the new release, which might leave the host in an inconsistent and non-working state.

3.3. Obtain the SWAMP-in-a-Box Installer

Visit <https://github.com/mirswamp/deployment> for instructions on how to download SWAMP-in-a-Box as a pre-packaged installer, which is what the instructions below assume you are working with.

3.4. Extract the Installer

On the SWAMP-in-a-Box host, move or copy the following files into the same directory (any user's home directory is sufficient, for example):

- `extract-installer.bash`
- `swampinabox-<version>-installer.tar.gz`
- `swampinabox-<version>-platforms.tar.gz`
- `swampinabox-<version>-tools.tar.gz`

From that directory, run `extract-installer.bash`:

```
bash extract-installer.bash
```

When the script completes successfully, it will display the location of the SWAMP-in-a-Box installer. The instructions below will use `<installer-dir>` to refer to that directory.

3.5. Install/Upgrade SWAMP-in-a-Box's Dependencies

The directory `<installer-dir>/repos` contains set up scripts that will

- configure package repositories,
- install dependencies,
- enable required services, and
- create required user accounts.

Even if you have gone through this step on the SWAMP-in-a-Box host for a previous release of

SWAMP-in-a-Box, it is important to run the scripts for the current release as they will ensure that the correct versions of SWAMP-in-a-Box's dependencies are installed.

If your host has unrestricted access to the internet, as `root` (or using `sudo`), run the `install-all.bash` script:

```
<installer-dir>/repos/install-all.bash
```

If your host has restricted access to the internet, see [Installing Dependencies](#) for a list of SWAMP-in-a-Box's dependencies so that you can determine how best to install them on the host. Continue with the steps below after you have installed the dependencies.

If you run into issues with installing SWAMP-in-a-Box's dependencies, consult [the troubleshooting appendix](#) for possible solutions.

3.6. Run the Main SWAMP-in-a-Box Install/Upgrade Script

As `root` (or using `sudo`):

- If you're installing a new SWAMP-in-a-Box, run `install_swampinabox.bash`:

```
<installer-dir>/bin/install_swampinabox.bash
```

- If you're upgrading an existing SWAMP-in-a-Box, run `upgrade_swampinabox.bash`:

```
<installer-dir>/bin/upgrade_swampinabox.bash
```

Each script will prompt you for the passwords and other information listed above. Output will be saved to a log file, the exact location of which will be listed at the end of the process. If the install or upgrade is unsuccessful, the log file will be helpful in determining the cause.

When upgrading an existing SWAMP-in-a-Box, the script will also create a backup of the SWAMP's databases before making any modifications to them. Specifically, the following files will be created in the directory from which you run the upgrade:

- `bkup_all_databases.<YYYY_MM_DD>.sql`
- `bkup_information_schema.<YYYY_MM_DD>.sql`

3.7. Verify that the Install/Upgrade Was Successful

1. In a web browser, navigate to <https://<SWAMP-in-a-Box-hostname>/>.
2. Sign in to the SWAMP with the administrator account (username: `admin-s`).
3. Upload a package, create and run a new assessment of it, and view the results. Sample packages

can be found in `<installer-dir>/sample_packages`; see the `README.txt` file in that directory for more information about the samples.

3.8. Check for Updates

After upgrading an existing SWAMP-in-a-Box, refer to the section on [checking for updates](#) to determine whether there are components that still need to be upgraded. For example, if you have previously added on an [additional assessment platform](#) and there is an updated version of that platform available, you will have to download the new version separately and install it.

4. Configuring SWAMP-in-a-Box

For additional information on the configuration options discussed below, see the SWAMP-in-a-Box Reference Manual.

4.1. Configuring Assessments to Run Without Internet Access

By default, when an assessment is performed, the platform will first attempt to update its collection of installed packages. This step will fail when the SWAMP-in-a-Box host's access to the internet is limited, which will in turn cause the assessment as a whole to fail. For such hosts, it is possible to configure SWAMP-in-a-Box such that platforms skip this step.



This configuration will **not** make a difference if the package being assessed specifies additional dependencies or if it uses a build system or script that requires access to the internet. If the assessment framework cannot download and install the additional dependencies, or if the build fails due to not being able to access resources on the internet, the assessment will still fail.

4.1.1. Before You Begin

- You will need `root` access to the SWAMP-in-a-Box host.

4.1.2. Procedure

Modify `/opt/swamp/etc/swamp.conf` such that the line

```
SWAMP-in-a-Box.internet-inaccessible = false
```

reads instead as

```
SWAMP-in-a-Box.internet-inaccessible = true
```

Any assessments submitted after making this change should no longer fail due to not having access

to the internet, subject to the caveats noted above.

4.2. Configuring an SSL Certificate for SWAMP-in-a-Box

A self-signed certification is included by default when `httpd` and `mod_ssl` are installed for SWAMP-in-a-Box. Most web browsers will flag your SWAMP-in-a-Box website as insecure when using the self-signed certification. This section provides instructions for configuring SWAMP-in-a-Box to use an SSL certificate signed by a trusted certificate authority.



Below, the fully qualified domain name (FQDN) needs to correspond to the main URL for your SWAMP-in-a-Box website, for example <https://mysib.example.org>.

4.2.1. Acquire the SSL Certificate

The first step is to acquire a SSL certificate matching your SWAMP-in-a-Box domain name from a trusted certificate authority (CA). For the example above, the SSL certificate would match mysib.example.org.

1. Generate a private key without a passphrase. For the example domain name used above, the command would be:

```
openssl genrsa -des3 -out mysib.example.org.private.key
```

2. Create your CSR. For the example domain name used above, the command would be:

```
openssl req -new -key mysib.example.org.private.key -out mysib.example.org.csr
```

3. Purchase the SSL certificate by submitting your CSR. The vendor will send you the signed SSL certificate and any required intermediate certificates.

4.2.2. Install the SSL Certificate

The second step is to install the certificate on your SWAMP-in-a-Box and configure it for use with Apache (`httpd`).

1. Copy the certificates, along with the private key, to the SWAMP-in-a-Box host, typically in [/etc/pki/tls/certs](#) and [/etc/pki/tls/private](#).
2. Make the private key readable only by `root`.
3. Make the certificates readable by the web server (i.e., world readable).
4. Modify [/etc/httpd/conf.d/ssl.conf](#).

Set the path to your certificate and private key (based on the example domain used above):

```
SSLCertificateFile /etc/pki/tls/certs/mysib.example.org.cert
SSLCertificateKeyFile /etc/pki/tls/private/mysib.example.org.private.key
```

Depending on the specific SSL certificate, you may also need to set the path to the following files:

```
SSLCertificateChainFile
SSLCACertificateFile
```

Set the following parameters as shown:

```
SSLProtocol all -SSLv2 -SSLv3
SSLCipherSuite
EDH+CAMELLIA:EDH+aRSA:EECDH+aRSA+AESGCM:EECDH+aRSA+SHA256:EECDH:+CAMELLIA128:+AES128
8:+SSLv3:!aNULL:!eNULL:!LOW:!3DES:!MD5:!EXP:!PSK:!DSS:!RC4:!SEED:!IDEA:!ECDSA:kEDH:
CAMELLIA128-SHA:AES128-SHA
SSLHonorCipherOrder On
```

4.3. Configuring Outgoing Email for SWAMP-in-a-Box

Enabling outgoing email allows the SWAMP to send email notifications to users. The following functionality is enabled when outgoing email is enabled:

- New user accounts are "pending" until email address is verified.
- Users can edit email addresses. Changes take place once verified.
- User email addresses are displayed throughout the user interface.
- Users can request a password reset through an email link.
- Users can request an email indicating the username associated with an email address.
- Permission requests, project invitations, and SWAMP admin invitations are handled through email notifications in addition to the notification system in the SWAMP UI.
- Users can opt to receive an email on completion of an assessment.
- SWAMP Administrators can configure Restricted Domains for email addresses.
- SWAMP Administrators can send system emails to one or more SWAMP users.
- SWAMP Administrators can flag users to force a password reset the next time they sign in.
- SWAMP Administrators can flag inactive users as hibernated. This forces a password reset the next time the user signs in.
- Contact Us and Report Security Incident pages (if enabled) include a means to submit a message directly through the web interface.
- Emails are sent to notify users of events such as removal from project membership and disabling and re-enabling of projects and user accounts.

4.3.1. Before You Begin

- You need `root` access to the SWAMP-in-a-Box host.
- You need an SMTP server that you are authorized to relay mail through.

4.3.2. Modify `/etc/postfix/main.cf` to Use Your SMTP Server

- Set the `relayhost` attribute to your SMTP server.
- Restart the postfix service by running the following command as `root` (or using `sudo`):

```
service postfix restart
```

4.3.3. Modify `/var/www/swamp-web-server/.env` to Enable Outgoing SWAMP Email

- Set `MAIL_ENABLED` to "true".
- Set `MAIL_DRIVER` to "sendmail".
- Set the `MAIL_FROM_ADDRESS` and `MAIL_FROM_NAME` to the email address and name you want to use as the sender of outgoing SWAMP emails.
- Set the `MAIL_CONTACT_ADDRESS` to the email address you want to receive contact email from users. This is displayed in the content of some SWAMP emails.
- Set the `MAIL_SECURITY_ADDRESS` to the email address you want to receive security reports from users. This is displayed in the content of some SWAMP emails.

4.3.4. Enable "Contact Us" for SWAMP-in-a-Box

Enabling "Contact Us" creates a Contact link in the SWAMP menu bar. This link provides access to the "Contact Us" page, which displays general contact information and, if email is enabled, provides a form for users to submit a contact/support message.

Step 1: Modify `/var/www/html/config/config.json` to enable the "Contact Us" page and set display parameters.

- Add a `contact` array containing a `support` array.
- Add `email`, `phoneNumber`, `description`, and `message`, values to the `support` array.

Note:

- The `config.json` file defines parameters within JSON arrays. Therefore, it is important to maintain the array format when editing, adding, or removing parameters in this file.

Sample:

```
"contact": {
  "support": {
    "email": "<Support email address (optional)>",
    "phoneNumber": "<Support phone number (optional)>",
    "description": "Support staff",
    "message": "Feel free to contact us with questions."
  }
},
```

Step 2: Modify `/var/www/swamp-web-server/.env` to configure contact message recipients. This is only necessary if outgoing email is enabled.

- Set `MAIL_CONTACT_ADDRESS` to the email address of the recipient of "Contact Us" messages.
- Set `MAIL_CONTACT_NAME` to the name of the recipient of "Contact Us" messages.

4.3.5. Enable "Report Security Incident" for SWAMP-in-a-Box

Enabling "Report Security Incident" creates a Security link on the SWAMP Contact Us page. This link provides access to the "Report Security Incident" page, which displays information about reporting a security incident and, if email is enabled, provides a form for users to submit a security incident report.

You must have already enabled the "Contact Us" page (see above).

Step 1: Modify `/var/www/html/config/config.json` to enable the "Report Security Incident" page and set display parameters.

- Add a `security` array to the `contact` array (see sample).
- Add `email`, `phoneNumber`, `description`, and `message`, values to the "security" array (see sample).

Note:

- The `config.json` file defines parameters within JSON arrays. Therefore, it is important to maintain the array format when editing, adding, or removing parameters in this file.

Sample:

```

"contact": {
  "support": {
    "email": "<Support email address (optional)>",
    "phoneNumber": "<Support phone number (optional)>",
    "description": "Support staff",
    "message": "Feel free to contact us with questions."
  },
  "security": {
    "email": "<Security email address (optional)>",
    "phoneNumber": "<Security phone number (optional)>",
    "description": "Security team",
    "message": "<Security message here (optional)>"
  }
},

```

Step 2: Modify `/var/www/swamp-web-server/.env` to configure security incident message recipients. This is only necessary if outgoing email is enabled.

- Set `MAIL_SECURITY_ADDRESS` to the email address of the recipient of "Report Security Incident" messages.
- Set `MAIL_SECURITY_NAME` to the name of the recipient of "Report Security Incident" messages.

4.4. Configuring LDAP for User Authentication and Attributes

In a basic installation of SWAMP-in-a-Box, user information for the SWAMP is stored in the `project` database in the `user` table with the following information (attributes):

- SWAMP user UID
- username
- password (encrypted using BCrypt)
- first name
- last name
- full name
- email
- affiliation

It is possible to configure the SWAMP to use a local LDAP or Active Directory (AD) server—assuming Active Directory has been configured to act as an LDAP server, as is the default—to store user records and their attributes.

You can configure your SWAMP-in-a-Box to access user accounts in the LDAP/AD server in one of two ways: with read-only access or with the ability to create and edit records in the LDAP/AD server.

You would configure your SWAMP-in-a-Box with read-only access to an LDAP/AD server when the LDAP/AD server is managed by processes external to the SWAMP. Your SWAMP-in-a-Box may then be one of multiple clients of the LDAP/AD server. In this case, the SWAMP does not provide workflows to create user records or edit any of the user attributes described above.

If you configure SWAMP-in-a-Box with the ability to create and edit user records in the LDAP/AD server, it is assumed that the SWAMP is the primary, if not only, client of the LDAP/AD server. In this case, the SWAMP provides the same workflows for creating and editing user records that it does when it is not configured with an LDAP/AD server. The only difference is that the user records and attributes described above are stored in the LDAP/AD server instead of in the `user` table in the SWAMP's local database.

4.4.1. Configuring LDAP Options in the Web Backend Configuration File

Before You Begin

- You will need `root` access to the SWAMP-in-a-Box host.
- Consult the SWAMP-in-a-Box Reference Manual for detailed descriptions of the parameters discussed below.

Procedure

1. As `root` (or using `sudo`), edit the web backend configuration file:

```
vi /var/www/swamp-web-server/.env
```

2. Set the following parameters to enable LDAP and configure whether LDAP is read-only:

```
LDAP_ENABLED  
LDAP_READ_ONLY
```

3. Set the following parameters to determine how user passwords are validated:

```
APP_PASSWORD_ENCRYPTION_METHOD  
LDAP_PASSWORD_VALIDATION
```

4. Set the following parameters to identify your LDAP/AD server and provide SWAMP-in-a-Box access to it:

```
LDAP_HOST  
LDAP_PORT  
LDAP_WEB_USER  
LDAP_WEB_USER_PASSWORD  
LDAP_PASSWORD_SET_USER (only if LDAP_READ_ONLY=false)  
LDAP_PASSWORD_SET_USER_PASSWORD (only if LDAP_READ_ONLY=false)
```

5. Set the following parameters to identify where in the LDAP/AD structure user records are stored:

```
LDAP_BASE_DN
LDAP_USER_RDN_ATTR
```

6. Set the following parameters to map SWAMP user attributes to the corresponding attributes in your LDAP/AD server:

```
LDAP_SWAMP_UID_ATTR
LDAP_FIRSTNAME_ATTR
LDAP_LASTNAME_ATTR
LDAP_FULLNAME_ATTR
LDAP_PASSWORD_ATTR
LDAP_USERNAME_ATTR
LDAP_EMAIL_ATTR
LDAP_ORG_ATTR
```

7. Set the following parameter with a comma-separated list of the `objectClass` attributes required for new user records in your LDAP/AD server. This is applicable only if `LDAP_READ_ONLY=false`.

```
LDAP_OBJECTCLASS
```

8. Save your changes to the `.env` file.

4.4.2. Designating an Initial SWAMP Administrator

When SWAMP-in-a-Box is installed, a default SWAMP administrator user is set up. The user record for this SWAMP administrator, the "admin-s" user, is stored in the SWAMP's local database. You can sign in as this user and invite other SWAMP users to become SWAMP administrators, as needed.

However, SWAMP-in-a-Box is designed to access only one source of user records. Therefore, when you configure SWAMP-in-a-Box to use an LDAP/AD server for user records, you can no longer sign in to your SWAMP with users whose records are stored in the local database. This means that initially, on configuring SWAMP-in-a-Box to use a local LDAP/AD server, your SWAMP will have no administrator users.

You can use the following procedure to promote a user to a SWAMP administrator.

Before You Begin

- You will need access to the SWAMP-in-a-Box host.
- You should have configured the SWAMP-in-a-Box to use an LDAP/AD server.
- You should have signed up or signed in to your SWAMP with the user to be promoted.
- You will need the `SWAMP_UID` value for the user to be promoted. This is the value which

corresponds to the `LDAP_SWAMP_UID_ATTR` attribute for the user.

- You will need the password for the `web` database user for the SWAMP's SQL database. This can be found in `/var/www/swamp-web-server/.env` on the SWAMP-in-a-Box host. Note that `root` access is required to view this file.

Procedure

1. Enter the following on the command line for your SWAMP-in-a-Box host:

```
export PROJECT_DB_HOST=localhost
export PROJECT_DB_PORT=3306
export PROJECT_DB_DATABASE=project
export PROJECT_DB_USERNAME=web
export SWAMP_UID=<unique SWAMP_UID of new admin user>
mysql -h $PROJECT_DB_HOST -P $PROJECT_DB_PORT -u $PROJECT_DB_USERNAME -p \
-e "USE $PROJECT_DB_DATABASE; UPDATE user_account SET admin_flag=1 \
WHERE user_uid='$SWAMP_UID';"
```

2. When prompted, enter the password for the `web` database user.
3. Sign in to the SWAMP with the user and confirm that the user now has SWAMP administrator access.

4.4.3. Examples

Below are some examples showing the output of a command line `ldapsearch` query and the corresponding `.env` configuration.

Example 3. Secure LDAP Server with Anonymous Read Access

ldapsearch command

```
ldapsearch -LLL -x -H ldaps://ldap.ncsa.illinois.edu \
-b "dc=ncsa,dc=illinois,dc=edu" "(sn=*smith*)"
```

ldapsearch output

```
dn: uid=jsmith,ou=People,dc=ncsa,dc=illinois,dc=edu
cn: John Smith
givenName: John
sn: Smith
uid: jsmith
mail: jsmith@illinois.edu
employeeType: all_ncsa_employe
objectClass: top
objectClass: person
objectClass: organizationalPerson
objectClass: inetOrgPerson
objectClass: inetUser
objectClass: posixAccount
uidNumber: 28064
gidNumber: 202
homeDirectory: /afs/ncsa/.u7/jsmith
loginShell: /bin/csh
memberOf: cn=jira-users,ou=Groups,dc=ncsa,dc=illinois,dc=edu
memberOf: cn=grp_bw_ncsa_staf,ou=Groups,dc=ncsa,dc=illinois,dc=edu
memberOf: cn=org_all_groups,ou=Groups,dc=ncsa,dc=illinois,dc=edu
memberOf: cn=org_do,ou=Groups,dc=ncsa,dc=illinois,dc=edu
memberOf: cn=all_ncsa_employe,ou=Groups,dc=ncsa,dc=illinois,dc=edu
memberOf: cn=grp_jira_users,ou=Groups,dc=ncsa,dc=illinois,dc=edu
memberOf: cn=all_users,ou=Groups,dc=ncsa,dc=illinois,dc=edu
memberOf: cn=grp_bldg_ncsa,ou=Groups,dc=ncsa,dc=illinois,dc=edu
memberOf: cn=grp_bldg_both,ou=Groups,dc=ncsa,dc=illinois,dc=edu
memberOf: cn=org_cisr,ou=Groups,dc=ncsa,dc=illinois,dc=edu
memberOf: cn=org_ici,ou=Groups,dc=ncsa,dc=illinois,dc=edu
memberOf: cn=org_csd,ou=Groups,dc=ncsa,dc=illinois,dc=edu
memberOf: cn=prj_cerb_users,ou=Groups,dc=ncsa,dc=illinois,dc=edu
memberOf: cn=iam_sec_testing,ou=Groups,dc=ncsa,dc=illinois,dc=edu
memberOf: cn=lsst_users,ou=Groups,dc=ncsa,dc=illinois,dc=edu
memberOf: cn=lsst_security,ou=Groups,dc=ncsa,dc=illinois,dc=edu
memberOf: cn=ncsa-ca,ou=Groups,dc=ncsa,dc=illinois,dc=edu
```

Corresponding `.env` entry

```
LDAP_ENABLED=true
LDAP_PASSWORD_VALIDATION=true
LDAP_READ_ONLY=true
LDAP_HOST=ldaps://ldap.ncsa.illinois.edu
LDAP_PORT=636
LDAP_BASE_DN=ou=People,dc=ncsa,dc=illinois,dc=edu
LDAP_USER_RDN_ATTR=uid
LDAP_SWAMP_UID_ATTR=uid
LDAP_FIRSTNAME_ATTR=givenName
LDAP_LASTNAME_ATTR=sn
LDAP_FULLNAME_ATTR=cn
LDAP_PASSWORD_ATTR=userPassword
LDAP_USERNAME_ATTR=uid
LDAP_EMAIL_ATTR=mail
LDAP_ORG_ATTR=ignore
LDAP_OBJECTCLASS=<not applicable, ldap is read-only>
LDAP_WEB_USER=<user here>
LDAP_WEB_USER_PASSWORD=<password here>
LDAP_PASSWORD_SET_USER=<not applicable, ldap is read-only>
LDAP_PASSWORD_SET_USER_PASSWORD=<not applicable, ldap is read-only>
```

Notes

In the query response, you should see:

```
dn: uid=jsmith,ou=People,dc=ncsa,dc=illinois,dc=edu
```

In this case, the `LDAP_USER_RDN_ATTR` is the key for the `uid=jsmith` portion of the `dn`, and the `LDAP_BASE_DN` is the rest of the `dn` string.

Since the `uid` field is globally unique in the LDAP directory, we set that for `LDAP_SWAMP_UID_ATTR`.

We also want the user to enter "jsmith" for username/password, so we use the default value for `LDAP_USERNAME_ATTR=uid`.

Finally, we use the default value of `LDAP_PORT=636` because we are connecting with `ldaps://`.

Example 4. Insecure Active Directory Server with Credentialed User

ldapsearch command

```
ldapsearch -LLL -x -H ldap://128.104.100.232 \  
  -b "dc=swamp,dc=ad" \  
  -D "ldapquery@swamp.ad" \  
  -W "(sAMAccountName=*jsmith*)" \  
Enter LDAP Password: <password entered>
```

ldapsearch output

```
dn: CN=John Smith,CN=Users,DC=swamp,DC=ad
objectClass: top
objectClass: person
objectClass: organizationalPerson
objectClass: user
cn: John Smith
sn: Smith
telephoneNumber: +1 555 5551234
givenName: John
distinguishedName: CN=John Smith,CN=Users,DC=swamp,DC=ad
instanceType: 4
whenCreated: 20161102135807.0Z
whenChanged: 20161103141526.0Z
displayName: John Smith
uSNCreated: 65515
memberOf: CN=Domain Admins,CN=Users,DC=swamp,DC=ad
uSNChanged: 66272
streetAddress:: MTIwNSBXLiBDbGFyayBTdC4NC1VYmFuYSwgSUwgNjE4MjE=
name: John Smith
objectGUID:: 4YwXKKIRxEOMD9BK4WaXGQ==
userAccountControl: 66048
badPwdCount: 0
codePage: 0
countryCode: 0
badPasswordTime: 131231177822233920
lastLogoff: 0
lastLogon: 131231177936769682
pwdLastSet: 131225686874147433
primaryGroupID: 513
objectSid:: AQUAAAAAAAAUAAAA7H5ID12ZLbb2qCf1UgQAAA==
adminCount: 1
accountExpires: 9223372036854775807
logonCount: 1
sAMAccountName: jsmith
sAMAccountType: 805306368
userPrincipalName: jsmith@swamp.ad
objectCategory: CN=Person,CN=Schema,CN=Configuration,DC=swamp,DC=ad
dSCorePropagationData: 20161102144813.0Z
dSCorePropagationData: 16010101000000.0Z
lastLogonTimestamp: 131226561268705498
mail: jsmith@illinois.edu
```

Corresponding `.env` entry

```
LDAP_ENABLED=true
LDAP_PASSWORD_VALIDATION=true
LDAP_READ_ONLY=true
LDAP_HOST=ldap://128.104.100.232
LDAP_PORT=389
LDAP_BASE_DN=cn=Users,dc=swamp,dc=ad
LDAP_USER_RDN_ATTR=cn
LDAP_SWAMP_UID_ATTR=userPrincipalName
LDAP_FIRSTNAME_ATTR=givenName
LDAP_LASTNAME_ATTR=sn
LDAP_FULLNAME_ATTR=cn
LDAP_PASSWORD_ATTR=userPassword
LDAP_USERNAME_ATTR=sAMAccountName
LDAP_EMAIL_ATTR=mail
LDAP_ORG_ATTR=ignore
LDAP_OBJECTCLASS=<not applicable, ldap is read-only>
LDAP_WEB_USER=ldapquery@swamp.ad
LDAP_WEB_USER_PASSWORD=<password here>
LDAP_PASSWORD_SET_USER=<not applicable, ldap is read-only>
LDAP_PASSWORD_SET_USER_PASSWORD=<not applicable, ldap is read-only>
```

Notes

In the query response, you should see:

```
dn: CN=John Smith,CN=Users,DC=swamp,DC=ad
```

In this case, the `LDAP_USER_RDN_ATTR` is the key for the `cn=John Smith` portion of the `dn`, and the `LDAP_BASE_DN` is the rest of the `dn` string.

The user "`ldapquery@swamp.ad`" was configured in the AD server to have read access for the other users in the server. This was an out-of-band step.

We need a unique AD identifier to store in the local SWAMP database. In this case, we configure `LDAP_SWAMP_UID_ATTR=userPrincipalName`, but any other unique identifier could be used.

We want the user to enter "jsmith" for username/password, so we use `LDAP_USERNAME_ATTR=sAMAccountName`.

Since `LDAP_HOST` is using `ldap://`, we configure `LDAP_PORT=389` (insecure). Note that it is a bad idea to use an insecure LDAP protocol since user passwords would be transmitted in the clear.

4.4.4. Other Considerations

Required Attributes

When the SWAMP creates new users, it will always populate the following:

- SWAMP user UID
- username
- password
- first name
- last name
- full name
- email (unless email is disabled)

If you want to configure SWAMP-in-a-Box to be able to add and edit user records in an LDAP/AD server, you must have a unique corresponding attribute mapped for each of these values.

Similarly, if you have required attributes for user records in your LDAP/AD server, each must be mappable to one of the above values. Otherwise, the SWAMP will not be able to set them, and any attempt by the SWAMP to create new user records will fail.

If email is a required attribute for your LDAP/AD server but you want to configure SWAMP-in-a-Box with email disabled, you can map your email attribute, and the SWAMP will populate that attribute with a space (" ") when it creates new user records.

If you have more required attributes for your LDAP/AD server than the SWAMP can accommodate, you should configure SWAMP-in-a-Box to access your LDAP/AD server as read only.

Password Validation

If SWAMP-in-a-Box is configured for read-only access to the LDAP/AD server, then the LDAP/AD server should validate passwords.

- Set `LDAP_PASSWORD_VALIDATION=true`

If SWAMP-in-a-Box is configured to be able to add and edit records in the LDAP/AD server, and your LDAP/AD server is configured to encrypt user passwords itself, then the SWAMP should not encrypt passwords, and the LDAP/AD server should validate passwords.

- Set `APP_PASSWORD_ENCRYPTION_METHOD=NONE`
- Set `LDAP_PASSWORD_VALIDATION=true`

If SWAMP-in-a-Box is configured to be able to add and edit records in the LDAP/AD server, and your LDAP/AD server is not configured to encrypt user passwords, then the SWAMP should handle password encryption and validation.

- Set `APP_PASSWORD_ENCRYPTION_METHOD=BCRYPT`
- Set `LDAP_PASSWORD_VALIDATION=false`

LDAP Size

If your LDAP/AD server has several thousand users, your SWAMP administrator user may not be able to manage users. This is dependent on how the limits on the LDAP/AD server are configured. If the server limits the number of records that can be returned on a search, the SWAMP may receive only a subset of users when asking for all users. This in turn affects the "Review Accounts" page by causing it to show only a subset of the SWAMP's users.

4.5. Configuring Third-party Sign-in via OAuth2 Providers

The SWAMP can be configured to use external OAuth2 identity providers. Currently, the following identity providers are supported:

- [GitHub](#)
- [Google](#)
- [CILogon](#)

4.5.1. Creating a GitHub OAuth Application for Your SWAMP-in-a-Box

Before You Begin

- You will need a GitHub account or organization for which to register an OAuth application.

Procedure

1. Sign in to your GitHub account, or sign in and access your organization.
2. Navigate to the user's or organization's "Settings" page.
3. Under "Developer Settings", navigate to the "OAuth Applications" page:
 - User: <https://github.com/settings/developers>
 - Organization: https://github.com/organizations/<organization_name>/settings/applications
4. Click the "Register a new application" button.
5. Enter the following information:
 - Application name: "SWAMP-in-a-Box" or the name of your SWAMP-in-a-Box
 - Homepage URL: The URL to your SWAMP-in-a-Box's or organization's home page
 - Application description: Optional, you can leave this blank
 - Authorized callback URL: "https://<hostname>/oauth2", using your SWAMP-in-a-Box's hostname
6. Click the "Register application" button.
7. (Optional) Add an application logo on the summary screen. Click the "Update application" button when finished.
8. Copy down the "Client ID" and "Client Secret".

4.5.2. Enabling GitHub as an OAuth2 Provider

Before You Begin

- You will need `root` access to the SWAMP-in-a-Box host.
- You will need the "Client ID" and "Client Secret" for your SWAMP-in-a-Box's GitHub OAuth application.

Procedure

1. As `root` (or using `sudo`), edit the web backend configuration file:

```
vi /var/www/swamp-web-server/.env
```

2. Set the following parameters:

```
GITHUB_ENABLED=true  
GITHUB_CLIENT_ID=<Your Client ID>  
GITHUB_CLIENT_SECRET=<Your Client Secret>
```

3. Save your changes.

4.5.3. Creating Google OAuth Credentials for Your SWAMP-in-a-Box

Before You Begin

- You will need a Google account for which to enable the Google+ API and create OAuth credentials.

Procedure

1. Sign in to your Google account.
2. Navigate to the Google API Manager: <https://console.developers.google.com/>.
3. Select or create a Project for your SWAMP-in-a-Box OAuth credentials.
4. Enable the Google+ API for your project:
 - On the left, under API Manager, select "Library".
 - On the right, under Social APIs, select the link for "Google+ API".
 - Click the "Enable" button.
5. Configure the OAuth consent screen:
 - On the left, under API Manager, select "Credentials".
 - On the right, under Credentials, select "OAuth consent screen".
 - Enter the following information:
 - Email address: Your email

- Product name shown to users: "SWAMP-in-a-Box" or the name of your SWAMP-in-a-Box
 - Homepage URL: The URL to your SWAMP-in-a-Box's or organization's home page
 - Product logo URL: The URL to a logo for your SWAMP-in-a-Box. For example, mir-swamp.org uses: <https://www.mir-swamp.org/images/logos/swamp-icon-small.png>.
 - Privacy policy URL: The URL to your privacy policy. For example, mir-swamp.org uses: <https://www.swampinbox.org/doc/SWAMP-Privacy-Policy.pdf>.
 - Terms of service URL: The URL to your terms of service. For example, mir-swamp.org uses: <https://www.mir-swamp.org/#policies/acceptable-use-policy>.
- Click "Save".

6. Configure OAuth Client ID Credentials:

- On the left, under API Manager, select "Credentials".
- On the right, under Credentials, select "OAuth client ID" from the "Create credentials" menu.
- Under "Application type", select "Web application".
- Enter the following information:
 - Name: "SWAMP-in-a-Box" or the name of your SWAMP-in-a-Box
 - Authorized JavaScript origins: "https://<hostname>", using your SWAMP-in-a-Box's hostname
 - Authorized redirect URIs: "https://<hostname>/oauth2", using your SWAMP-in-a-Box's hostname
- Click "Create".

7. Copy down the "Client ID" and "Client Secret".

4.5.4. Enabling Google as an OAuth2 Provider

Before You Begin

- You will need `root` access to the SWAMP-in-a-Box host.
- You will need the "Client ID" and "Client Secret" for your SWAMP-in-a-Box's Google OAuth credentials.

Procedure

1. As `root` (or using `sudo`), edit the web backend configuration file:

```
vi /var/www/swamp-web-server/.env
```

2. Set the following parameters:

```
GOOGLE_ENABLED=true
GOOGLE_CLIENT_ID=<Your Client ID>
GOOGLE_CLIENT_SECRET=<Your Client Secret>
```

3. Save your changes.

4.5.5. Registering for CILogon OAuth2 Credentials

Procedure

1. Go to <https://cilogon.org/oauth2/register>.
2. Enter the following information:
 - Client Name: "SWAMP-in-a-Box" or the name of your SWAMP-in-a-Box
 - Contact email: Your email address
 - Home URL: The URL to your SWAMP-in-a-Box's or organization's home page
 - Uncheck "Use Limited Proxy Certificates"
 - Callback URLs: "https://<hostname>/oauth2", using your SWAMP-in-a-Box's hostname
3. Click the "Submit" button.
4. Copy down the client identifier and client secret.
5. Wait for email approval from CILogon Administrator.

4.5.6. Enabling CILogon as an OAuth2 Provider

Before You Begin

- You will need `root` access to the SWAMP-in-a-Box host.
- You will need the client identifier and client secret for your SWAMP-in-a-Box's CILogon OAuth2 credentials.

Procedure

1. As `root` (or using `sudo`), edit the web backend configuration file:

```
vi /var/www/swamp-web-server/.env
```

2. Set the following parameters:

```
CILOGON_ENABLED=true
CILOGON_CLIENT_ID=<Your Client ID>
CILOGON_CLIENT_SECRET=<Your Client Secret>
```

3. Save your changes.

5. Installing Additional Components

5.1. Assessment Platforms

The SWAMP-in-a-Box installer includes and installs only the Ubuntu 16.04 platform for performing assessments. For C/C++ packages, additional platforms are available, including releases of CentOS, Debian, Fedora, Scientific Linux, and older releases of Ubuntu. (Packages for other languages will always be assessed on Ubuntu 16.04.)

5.1.1. Before You Begin

- You will need `root` access to the SWAMP-in-a-Box host.
- You will need `root` access to the SWAMP-in-a-Box database.

5.1.2. Procedure

1. Visit <https://platform.swampinabox.org/platform-images/>.
2. Download and copy to the SWAMP-in-a-Box host the `.qcow2.gz` files corresponding to the additional platforms you wish to perform assessments on. The naming scheme for these files is as follows:

```
condor-<Linux distribution>-<version>-<32 or 64 bit>-master-<YYYYMMDD>.qcow2.gz
```

When downloading the files, name the copies exactly as shown on <https://platform.swampinabox.org/>. Otherwise, they will not be recognized as supported platforms in the next step.

3. On the SWAMP-in-a-Box host, for each file, as `root` (or using `sudo`), run the `install_platform` script, providing the path to the `.qcow2.gz` file:

```
/opt/swamp/bin/install_platform <path to .qcow2.gz file>
```

When prompted, provide the password for the database's `root` user, which is needed to add the platform to the database and make it available in the SWAMP. Note that `install_platform` will likely take several minutes to complete due to the size of the file.

5.2. Assessment Tools

The SWAMP-in-a-Box installer includes and installs a variety of tools for assessing packages.

For C/C++ packages, three additional tools can be installed:

- [CodeSonar](#),
- [Parasoft C/C++test](#), and

- [Synopsys Static Analysis \(Coverity\)](#).

For Java packages, two additional tools can be installed:

- [OWASP Dependency Check](#) and
- [Parasoft Jtest](#).

The process for [obtaining tool installers/archives from their vendors](#) and [packaging them in the format that the SWAMP expects](#) differs significantly between the tools. However, once that is done, the process for [installing](#) and [configuring](#) the tools for use in the SWAMP is largely similar.

5.2.1. Before You Begin

- You will need `root` access to the SWAMP-in-a-Box host.
- You will need `root` access to the SWAMP-in-a-Box database.

5.2.2. Obtain the Tool Installer/Archive from Its Vendor

- For CodeSonar, Parasoft C/C++test, Parasoft Jtest, and Synopsys Static Analysis (Coverity): See the [appendix on SWAMP-in-a-Box add ons](#) for information on how to contact each tool's vendor. You will need to obtain one or both of the 32-bit and 64-bit Linux archives for the tool you wish to install. For Parasoft C/C++test and Parasoft Jtest, only versions 10.3.0 and later are supported.

You will also need to follow the vendor's instructions for setting up a license server and ensure that the SWAMP-in-a-Box host is able to contact the license server on the required ports. (None of the steps below will modify the configurations of any firewalls.)

The archives for CodeSonar should be named:

```
codesonar-<version>.<YYYYMMDD>-i686-pc-linux.tar.gz    (32-bit)
codesonar-<version>.<YYYYMMDD>-x86_64-pc-linux.tar.gz (64-bit)
```

The archives for Parasoft C/C++test should be named:

```
parasoft_cpptest_engine_<version>_linux.tar.gz      (32-bit)
parasoft_cpptest_engine_<version>_linux_x86_64.tar.gz (64-bit)
```

The archives for Parasoft Jtest should be named:

```
parasoft_jtest_<version>_linux_x86.tar.gz          (32-bit)
parasoft_jtest_<version>_linux_x86_64.tar.gz      (64-bit)
```

The archives for Synopsys Static Analysis (Coverity) should be named:

```
cov-analysis-linux-<version>.tar.gz    (32-bit)
cov-analysis-linux64-<version>.tar.gz  (64-bit)
```

- For OWASP Dependency Check: Visit <https://platform.swampinabox.org/tool-archives/> and download the `dependency-check-<version>.tar.gz` file corresponding to the version of OWASP Dependency Check that you would like to install. The archive from swampinabox.org includes scripts and documentation for integrating OWASP Dependency Check into the SWAMP.

5.2.3. Create the SWAMP Tool Archive

- For CodeSonar, Parasoft C/C++test, Parasoft Jtest, and Synopsys Static Analysis (Coverity): Run the `make_swamp_tool` script to package the vendor's installers into the archive format that the SWAMP uses.

```
/opt/swamp/bin/make_swamp_tool \  
  --tool-name <gt-csonar or coverity or ps-ctest or ps-jtest> \  
  --tool-version <version> \  
  --installer-linux32 <path to 32-bit archive> \  
  --installer-linux64 <path to 64-bit archive>
```

Specify `gt-csonar`, `coverity`, `ps-ctest`, or `ps-jtest` for the `--tool-name` option, depending on the tool being packaged. Omit the `--installer-linux32` option if you have only the 64-bit installer, and similarly for the `--installer-linux64` option.

When `make_swamp_tool` completes, the output should include the path to the SWAMP tool archive file that was created. Note that `make_swamp_tool` will likely take several minutes to complete due to the size of the installers.

- For OWASP Dependency Check: Expand the archive that you downloaded from swampinabox.org:

```
tar zxvf dependency-check-<version>.tar.gz
```

This should create a directory `dependency-check-<version>`. Inside the directory will be `README` files in various formats. Follow the directions in the `README` for creating the SWAMP tool archive for OWASP Dependency Check. Make note of whether you will need to [add additional entries to `services.conf`](#) or [configure assessments to run without internet access](#) (i.e., "internet-inaccessible" assessments).

5.2.4. Install the Tool

The `install_tool` script is used to install and manage any tools that are added onto a SWAMP-in-a-Box installation. The script must always be invoked with the following command line arguments:

- `--tool <id>`: This specifies the tool being managed. Recognized values for `<id>` include:

- **coverity**: Synopsys Static Analysis (Coverity)
- **dependency-check**: OWASP Dependency Check
- **gt-csonar**: GrammaTech CodeSonar
- **ps-ctest**: Parasoft C/C++test
- **ps-jtest**: Parasoft Jtest
- **--add**, **--remove**, **--replace**, or **--configure**: This determines the "mode" that the script will run in, i.e., whether to add a new version of the tool, remove an existing version of the tool, replace an existing version of the tool, or configure the tool. Depending on the mode selected, other command line arguments will be required.

To add a new version of a tool to the swamp, as **root** (or using **sudo**), run **install_tool** as follows:

```
/opt/swamp/bin/install_tool \
  --tool <id> \
  --add \
  --tool-version <version> \
  --tool-archive <path to SWAMP tool archive file>
```

For some tools, notably Parasoft C/C++test and Parasoft Jtest, you might need to pass a different version string to **install_tool** than the one for **make_swamp_tool**. For example, compared to the version string for **make_swamp_tool**, you might need to append **-2** or **-12** to match the filename produced by **make_swamp_tool**.

Note that **install_tool** will likely take several minutes to complete due to the size of the tool archive.

5.2.5. Configure the Tool

As **root** (or using **sudo**), run the **install_tool** script with the **--configure** option, providing additional options as needed.

- For tools that require a license server (CodeSonar, Parasoft C/C++test, Parasoft Jtest, and Synopsys Static Analysis (Coverity)), use the **--license-server-host** and **--license-server-port** options to specify the hostname of the license server to use and the port on which to contact the license server:

```
/opt/swamp/bin/install_tool \
  --tool <id> \
  --configure \
  --license-server-host <hostname of the license server> \
  --license-server-port <port number>
```

For Parasoft C/C++test and Parasoft Jtest, the script will prompt for the username and password to use for contacting the license server.

In addition, use the **--limit** option to specify how many simultaneous instances of the tool the

SWAMP may run:

```
/opt/swamp/bin/install_tool \  
  --tool <id> \  
  --configure \  
  --limit <max number of simultaneous instances>
```

- For tools that require additional `services.conf` entries (OWASP Dependency Check), use the `--tool-conf` option to specify the path to a file containing additional entries that should be added to `services.conf`:

```
/opt/swamp/bin/install_tool \  
  --tool <id> \  
  --configure \  
  --tool-conf <path to file containing entries for services.conf>
```

5.2.6. Manage the Installed Versions of the Tool

- Additional versions of each tool can be installed using the directions above. In the SWAMP web application, the "latest" version of the tool will be whichever version was **installed** most recently. We recommend installing multiple versions in order (e.g., 1.0, 2.0, 2.1, 3.0, etc.) so that the "latest" version matches users' expectations.
- If you have previously installed, say, only the 32-bit version of a tool and now wish to make both the 32-bit and 64-bit versions available, first [create the SWAMP tool archive](#), as above, to package the 32-bit and 64-bit archives together for the SWAMP. Then as `root` (or using `sudo`), run the `install_tool` script with the `--replace` option:

```
/opt/swamp/bin/install_tool \  
  --tool <id> \  
  --replace \  
  --tool-version <version> \  
  --tool-archive <path to SWAMP tool archive file>
```

- If you wish to remove a version of a tool from the SWAMP, as `root` (or using `sudo`), run the `install_tool` script with the `--remove` option, providing the version to remove:

```
/opt/swamp/bin/install_tool \  
  --tool <id> \  
  --remove \  
  --tool-version <version>
```

5.3. Viewers

The SWAMP-in-a-Box installer includes and installs only a "native" viewer for viewing the results of an assessment. The SWAMP web application also provides a link to download the raw results of an assessment as a SCARF XML file.

For users with needs that are not met by either of these options, it is possible to install a SWAMP-specific version of Code Dx for viewing results. See the [appendix on SWAMP-in-a-Box add ons for information about the SWAMP-specific version of Code Dx and how to obtain it](#). (SWAMP-in-a-Box currently does **not** support integrating with an existing, standalone Code Dx installation.)

5.3.1. Before You Begin

- You will need `root` access to the SWAMP-in-a-Box host.
- You will need `root` access to the SWAMP-in-a-Box database.
- You will need to obtain the `.war` file for the SWAMP-specific version of Code Dx from Code Dx, Inc. If you are provided with a `.zip` file or some other archive format, first expand the archive and locate the `.war` file within the expanded contents.

Note that the SWAMP officially supports version 1.8.3 of Code Dx. Later versions might work, but the experience for end users will be significantly different from 1.8.3.

5.3.2. Procedure

1. Copy the Code Dx `.war` file obtained from Code Dx, Inc. to the SWAMP-in-a-Box host.
2. On the SWAMP-in-a-Box host, as `root` (or using `sudo`), run the `install_codedx` script, providing the path to the `.war` file:

```
/opt/swamp/bin/install_codedx <path to Code Dx .war file>
```

When prompted, provide the password for the database's `root` user, which is needed to add the Code Dx viewer to the database and make it available in the SWAMP.

6. Administrative Commands

6.1. Checking for Updates

The SWAMP-in-a-Box upgrade script does not necessarily update all components of SWAMP-in-a-Box for which a newer version might be available. For example, if you have previously added on an [additional assessment platform](#) and there is an updated version of that platform available, you will have to download the new version separately and install it.

To check whether updated assessment platforms are available, run the following command (it does not require `root` access):

```
/opt/swamp/bin/swamp_check_platform_images
```

6.2. Updating the Host's Hostname

During the SWAMP-in-a-Box install process, the hostname specified for the host (usually, the host's detected hostname) is set in the SWAMP's various configuration files and its database. When the host's hostname changes, those configuration locations need to be updated in order for the system to continue functioning correctly. To do so, as `root` (or using `sudo`), run the following command:

```
/opt/swamp/bin/swamp_set_web_host <new hostname>
```

6.3. Managing the `swamp` System Service

SWAMP-in-a-Box includes a collection of daemons that run on the host, all managed by the `swamp` system service. These daemons must be running in order to submit and perform assessments. The `swamp` service and the daemons managed by it can be stopped and started using the standard commands for interacting with system services (the commands must be run as `root` or using `sudo`). For example:

```
service swamp start
service swamp stop
service swamp restart
```

6.4. Other Components

SWAMP-in-a-Box makes use of Apache HTTP Server, HTCondor, and MariaDB. For instructions on how to interact with or administer Apache HTTP Server, HTCondor, and MariaDB, refer to the documentation associated with each product. Be aware that the install and upgrade process for SWAMP-in-a-Box makes changes to their default configurations; see the SWAMP-in-a-Box Reference Manual for further details.

7. Documentation for Users of the SWAMP

Documentation for users of the SWAMP includes:

- [SWAMP User Manual](#)
- [Status.out and Debugging SWAMP Failures](#)

Links to these documents can be found on the Help page of the SWAMP web application.

8. Support and Contact Information

We welcome your feedback and contributions at:

- Email: sib@continuousassurance.org
- Phone: +1 (317) 274-3942

We also host a mailing list for the user community:

- Email: swampinabox@lists.discovery.wisc.edu
- Sign up: <https://lists.cosalab.org/mailman/listinfo/swampinabox>

Appendix A: Installing Dependencies

The software packages that SWAMP-in-a-Box depends on include:

- [HTCondor 8.6](#),
- [MariaDB 5.5](#),
- [PHP 7.0](#), and
- [other assorted utilities](#).

All of these dependencies must be installed in order for SWAMP-in-a-Box to function correctly. If you run into issues with installing these dependencies, consult [the troubleshooting appendix](#) for possible solutions.



In the sections below, `<installer-dir>` refers to the directory containing the SWAMP-in-a-Box installer. See [Installing and Upgrading SWAMP-in-a-Box](#).

A.1. HTCondor 8.6

The set-up scripts configure and download HTCondor from the repository hosted by the University of Wisconsin-Madison, generally following the instructions provided on the project's home page at <https://research.cs.wisc.edu/htcondor/index.html>. The specific packages installed are `condor-all` and its dependencies.

The following script will install HTCondor using the process described above:

```
<installer-dir>/repos/install-htcondor.bash
```

A.2. MariaDB 5.5

For CentOS 6, the set-up scripts configure and download MariaDB from the repository hosted by the MariaDB Foundation, using the configuration file produced by the "repository configuration" tool at <https://downloads.mariadb.org/mariadb/repositories/>. The specific packages installed are `MariaDB-`

`client`, `MariaDB-server`, `MariaDB-shared`, and their dependencies.

For CentOS 7, the set-up scripts download MariaDB from CentOS's default repositories. The specific packages installed are `mariadb`, `mariadb-server`, `mariadb-libs`, and their dependencies.

The following script will install MariaDB using the process described above:

```
<installer-dir>/repos/install-mariadb.bash
```

A.3. PHP 7.0

The set-up scripts configure and download PHP from Remi's RPM Repository, using the instructions produced by the "configuration wizard" at <http://rpms.famillecollet.com/>. The specific packages installed are:

- `php`,
- `php-ldap`,
- `php-mbstring`,
- `php-mcrypt`,
- `php-mysqlnd`,
- `php-pecl-zip`,
- `php-xml`,

and their dependencies.

The following script will install PHP using the process described above:

```
<installer-dir>/repos/install-php.bash
```

A.4. Other Assorted Utilities

In addition to HTCondor, MariaDB, and PHP, the set-up scripts download assorted software packages from CentOS's default repositories. The specific packages installed are:

- `ant`,
- `bind-utils`,
- `git`,
- `httpd`,
- `libguestfs`,
- `libguestfs-tools`,
- `libguestfs-tools-c`,

- `libvirt`,
- `mod_ssl`,
- `ncompress`,
- `patch`,
- `perl`,
- `unzip`,
- `zip`,

and their dependencies.

The following script will install these packages and perform additional, necessary configuration of the SWAMP-in-a-Box host. It must be run after HTCondor, MariaDB, and PHP are installed, as described above:

```
<installer-dir>/repos/install-other-deps.bash
```

Appendix B: About SWAMP-in-a-Box Add Ons

B.1. Code Dx

Through SWAMP's partnership with Code Dx, Inc., a SWAMP-specific version of Code Dx software has been created to be solely used with SWAMP software. Code Dx software shall not be redistributed with SWAMP software without written consent of Code Dx, Inc.

To obtain a SWAMP version of Code Dx, contact Code Dx, Inc. at:

- sales@codedx.com,
- +1-631-759-3993, or
- <https://codedx.com/support/?v=7516fd43adaa>.

After contacting Code Dx, Inc., you will be asked to agree to an End User's License Agreement (EULA) with Code Dx, Inc. Once you have agreed to the EULA, you will receive a download kit from Code Dx, Inc.

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B.2. CodeSonar

SWAMP-in-a-Box can be used with CodeSonar, a deep-path static analysis tool provided by GrammaTech, Inc. CodeSonar finds cases of undefined behavior (such as buffer overruns, null pointer dereferences, ...), API Misuse (use after free, socket API, ...), as well as suspicious behavior (dead code, unused variables, concurrency violations, taint, ...), and works on source code and

binaries.

Contact information for obtaining CodeSonar and licensing information for CodeSonar can be found at:

- sales@grammatech.com,
- +1-888-695-2668, or
- <https://www.grammatech.com/products/codesonar>.

CodeSonar is third-party software created and maintained by GrammaTech, Inc. Copyright 2018 GrammaTech, Inc. CodeSonar is a registered trademark of GrammaTech, Inc. All rights reserved.

B.3. Parasoft C/C++test and Parasoft Jtest

SWAMP-in-a-Box can be used with C/C++test and Jtest, static analysis and unit testing tools for C/C++, and Java development provided by Parasoft. Part of Parasoft's suite of automated software testing tools, these solutions facilitate software development best practices, rigorous bug detection, and security vulnerability remediation. Parasoft C/C++test and Jtest's static analysis and unit testing technologies bring efficiency to quality and compliance initiatives. The latest releases improve developer workflows, with a focus on enhanced environment and embedded support, and provide enriched dashboards and tracking, to aid users in addressing vulnerabilities in standards like OWASP, CWE, or achieving MISRA compliance.

Contact information for obtaining C/C++test or Jtest and licensing information for C/C++test or Jtest can be found at:

- swamp@parasoft.com, and
- +1-719-424-7907.

B.4. Synopsys Static Analysis (Coverity)

SWAMP-in-a-Box can be used with Synopsys Static Analysis (Coverity). Synopsys Static Analysis is an accurate and comprehensive static analysis solution for finding critical quality defects and security violations. Its high-fidelity analysis delivers business relevant findings for developers and security audit teams alike. Synopsys' SAST solutions are uniquely designed to scale from safety-critical IoT software to global enterprise systems.

Contact information for obtaining Synopsys Static Analysis (Coverity) and licensing information for Synopsys Static Analysis (Coverity) can be found at:

- software-integrity-sales@synopsys.com,
- U.S. Sales +1-800-873-8193,
- International Sales +1-415-321-5237, or
- <https://www.synopsys.com/software-integrity/security-testing/static-analysis-sast.html>.

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Appendix C: Troubleshooting SWAMP-in-a-Box

C.1. Resolving Issues with Installing SWAMP-in-a-Box's Dependencies

The SWAMP-in-a-Box setup and install process requires downloading and installing packages from multiple package repositories. On systems configured to check for GPG signatures on the repositories' metadata, this process might fail because not all of the repositories provide GPG signatures for their metadata. This is indicated by HTTP 404 errors when attempting to download `repomd.xml.asc` from the repository:

```
http://example.com/.../repomd.xml.asc: [Errno 14] HTTP Error 404 - Not Found
```

These GPG signature checks can be disabled by changing `repo_gpgcheck=1` to `repo_gpgcheck=0` in the configuration files used by `yum` (you will need `root` access to modify these files). To locate the configuration files that currently contain `repo_gpgcheck=1`, run the following command:

```
grep -lr "repo_gpgcheck=1" /etc/yum.conf /etc/yum.repos.d/
```

C.2. Collecting Log Files for Sending to SWAMP Staff

When helping debug an issue with assessments not running, SWAMP staff might ask to see the SWAMP's and HTCondor's log files. Run the following command to bundle these log files, along with HTCondor's configuration files, into a single file:

```
tar -zcv -f swampinabox-logs.tar.gz --exclude="*.old" \  
  /opt/swamp/log/*.errors \  
  /opt/swamp/log/*.log \  
  /var/log/condor/*Log \  
  /var/log/condor/*Log.slot* \  
  /etc/condor
```

This will create a file `swampinabox-logs.tar.gz` in the current working directory, which can then be sent to SWAMP staff. Errors from `tar` such as `No such file or directory` may safely be ignored (some of the log files that the command looks for might not exist on all systems).

C.3. Investigating Why an Assessment Failed

The status of an assessment can be monitored from the Assessment Results page of the SWAMP web

application. If "Auto Refresh" is checked, the page will refresh itself periodically.

If an assessment reaches a status of "Finished with Errors", the SWAMP is generally functioning as expected, but the assessment failed to yield any results. Click the "Error" button to view a detailed report about the failure. The report includes a link to [Status.out and Debugging SWAMP Failures](#), which describes the contents of the assessment's "status.out" file.

If an assessment appears to reach some other error state, the assessment's log file might indicate why:

1. On the Assessment Results page, click on the status string to go the Assessment Run Status page. Locate the execution record UUID.
2. The assessment's log file will be located at `/opt/swamp/log/<execution-record-UUID>.log` on the SWAMP-in-a-Box host.

C.4. Investigating Why an Assessment Is "Waiting in HTCondor Queue"

SWAMP-in-a-Box uses virtual machines managed by an HTCondor pool to perform assessments of packages. If assessments remain at a status of "Waiting in HTCondor Queue" and never appear to make progress, the HTCondor pool may have an issue that is preventing it from running the assessments.

C.4.1. Determining Whether HTCondor Is Generally Functional

HTCondor maintains a queue of jobs and a collection of resources to run those jobs. For SWAMP-in-a-Box, each job corresponds to a single assessment or instance of the [Code Dx viewer](#). The `condor_q` and `condor_status` commands can be used to examine these aspects of HTCondor:

- `condor_q`: Lists the jobs currently in the queue. HTCondor's ID for each job is shown in the "ID" column. The status of each job is shown in the "ST" column: "I" for idle; "R" for running; and "H" for on-hold, indicating that the job encountered an error.

`condor_q -better-analyze <job ID>` displays detailed information about why an idle job is not currently running. On a normally functioning system, it is common for a job to be idle because there are not enough free CPU or memory resources available yet (wait for other assessments to finish running).

`condor_q -hold <job ID>` displays information about why a job is on-hold. On a normally functioning system, no job should be on-hold.

- `condor_status`: Lists all of the available resources that HTCondor can use to run jobs. On a normally functioning system, there should be at least one "machine".

`condor_status -vm` lists all of the available resources that HTCondor can use to run jobs that require a virtual machine. All SWAMP jobs require a virtual machine. On a normally functioning system, there should be at least one "machine" in this list.

If any of these commands displays an error message, or if there are no resources available for running *any* jobs (i.e., `condor_status` lists nothing), it is likely that the commands and HTCondor's daemons are failing to communicate with each other successfully:

- On SWAMP-in-a-Box hosts with network interfaces that support both IPV4 and IPV6, one potential workaround is to force HTCondor to use IPV4. To do so, add `IPV6_ENABLE = false` to `/etc/condor/config.d/swampinabox_10_network.conf`.

If there are resources available for running jobs in general, but none for jobs that require a virtual machine, continue to the next section.

C.4.2. Determining Whether HTCondor Supports KVM Virtualization

For SWAMP-in-a-Box, HTCondor is configured to use KVM virtualization for running jobs that require a virtual machine. Run the following script to determine whether the SWAMP-in-a-Box host supports KVM virtualization, as described in the [hardware requirements](#) for SWAMP-in-a-Box:

```
/opt/swamp/bin/swamp_check_virtualization_support
```

If run as `root` (or using `sudo`), the script will display additional diagnostic output, which can be helpful in determining whether the SWAMP-in-a-Box host is running directly on physical hardware versus inside a virtual machine.

If the script does **not** find the necessary support for KVM virtualization, it will display an error message and a suggestion on how to resolve the issue.

If the script **does** find the necessary support for KVM virtualization, then what likely happened is that some job failed to start its virtual machine successfully. The immediate cause of the failure might be listed in `/var/log/condor/VMGahpLog` (look around the times an assessment was submitted or failed).

If the cause of the failure was transient, restarting the HTCondor service will cause HTCondor to start running jobs that require a virtual machine again. To restart the service, as `root` (or using `sudo`), run the following command:

```
service condor restart
```

Note that it might take a minute or two after running this command for all of HTCondor's daemons to restart and connect to each other.

If HTCondor again ends up not being able to run jobs that require a virtual machine (i.e., `condor_status -vm` shows no available resources), then there is likely a systemic issue. [Collect together log files](#) and [send them to SWAMP staff](#) for further investigation.

Appendix D: License and Notices

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Additional notices for the SWAMP can be found at the end of this section.

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