SECURITY EAGLES

SPLUNK

Part 2

Introduction To Splunk

splunk>

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An Introduction to Splunk Indexes

1. What is an Index in Splunk?

An index is like a big folder where Splunk stores all the data you send to it. It organizes the data so you can search it quickly later.

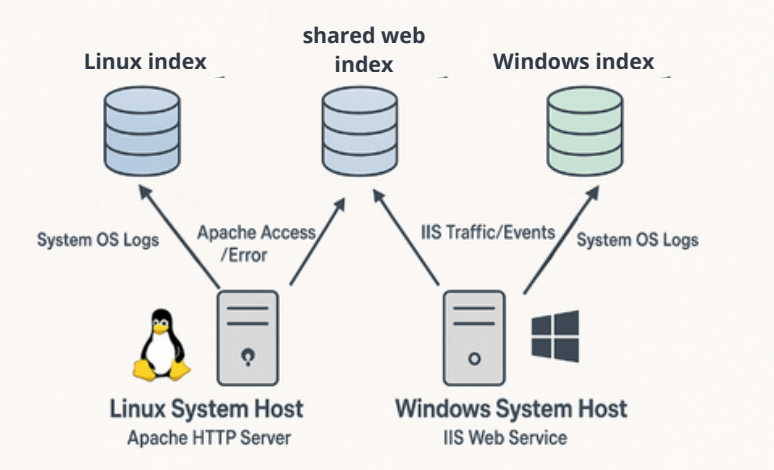
2. What does an Index do?

- **Stores Data:** It's the main place where Splunk saves your logs and information.
- **Groups Data:** You can keep similar data together (e.g., Linux logs in one index, web logs in another).
- **Controls Access:** You decide who can see which index (security).
- **Keeps Data for a Time:** You set how long Splunk keeps the data before deleting it.

3. Types of Indexes:

- **Events Index:** For normal logs and messages with time stamps.
- **Metrics Index:** For numbers like CPU usage or network speed. It's faster and uses less space for this kind of data.

4. How Indexes Work (Example):



Indexes help organize your data so searches are faster and easier.
Here's how it works:

- Linux logs → go into an index called linux_logs.
- Windows logs → go into an index called windows_logs.
- Web server logs → can go into a shared index called web_access.

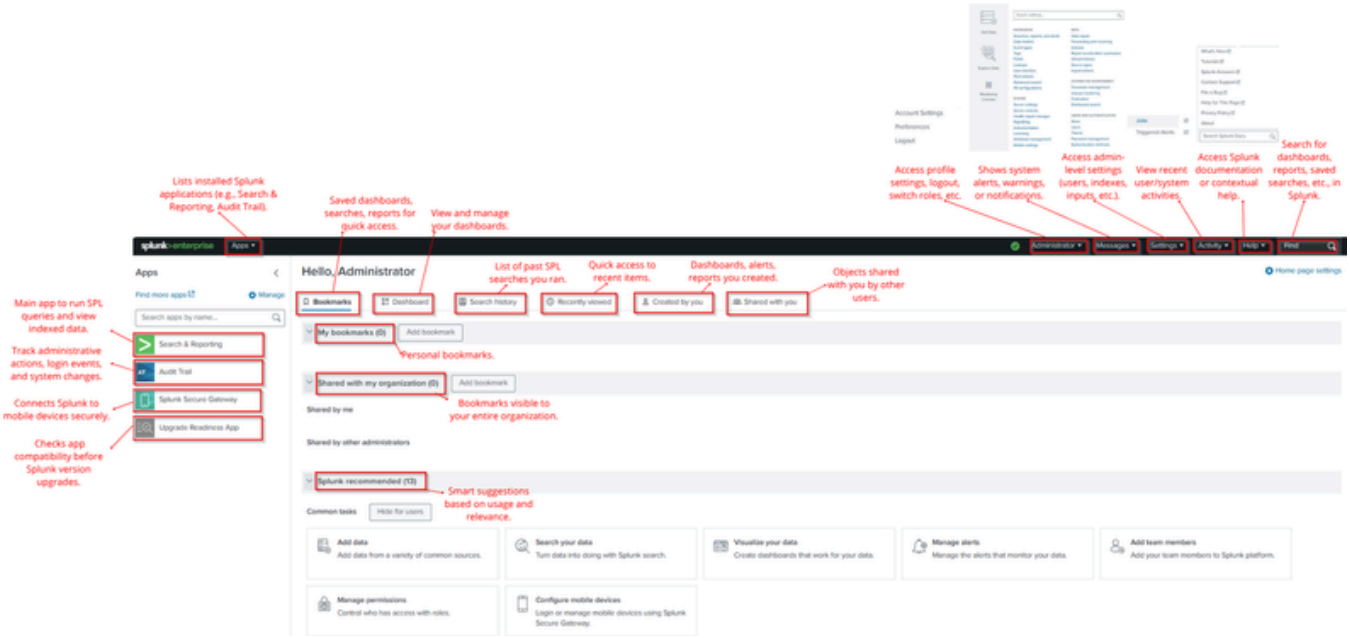
This structure makes searching and analysis simple because you know exactly where to look.

A First Look at the Splunk Web GUI

The Splunk Web interface is your main workspace for searching and analyzing data. It's designed to be simple and powerful.

1. The Splunk Enterprise Home Page

When you log in to Splunk, the Home Page is your main dashboard. It's the central hub for everything you do in Splunk.



Key Features on the Home Page:

- **Apps Panel:** Access installed apps like Search & Reporting (for running queries), Audit Trail, and more.
- **Bookmarks & Dashboards:** Quickly open saved searches, dashboards, and reports.
- **Navigation Bar:**
  - **Administrator Menu:** Manage your account settings.
  - **Messages & Settings:** View system alerts and configure Splunk settings.
  - **Activity & Help:** Check recent user activity and access documentation.
- **Search Bar:** Find dashboards, reports, and saved searches easily.

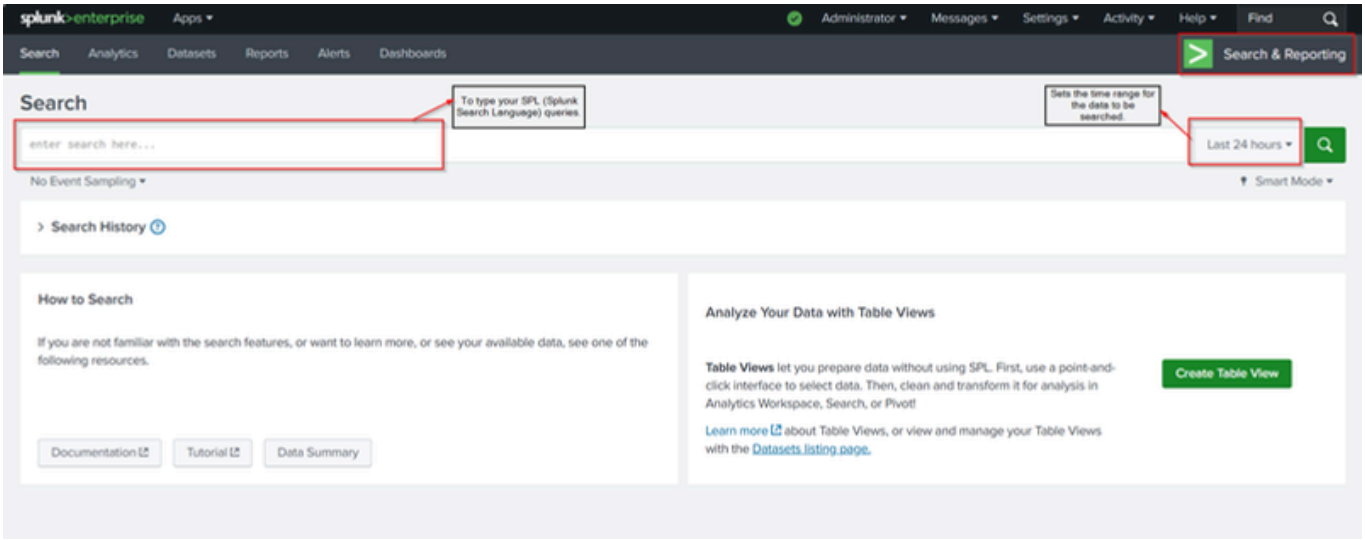
This page helps you start searches, manage data, and access dashboards all in one place.

2. Performing a Basic Search

The Search & Reporting app is where you'll spend most of your time in Splunk. It's the main tool for exploring and analyzing data.

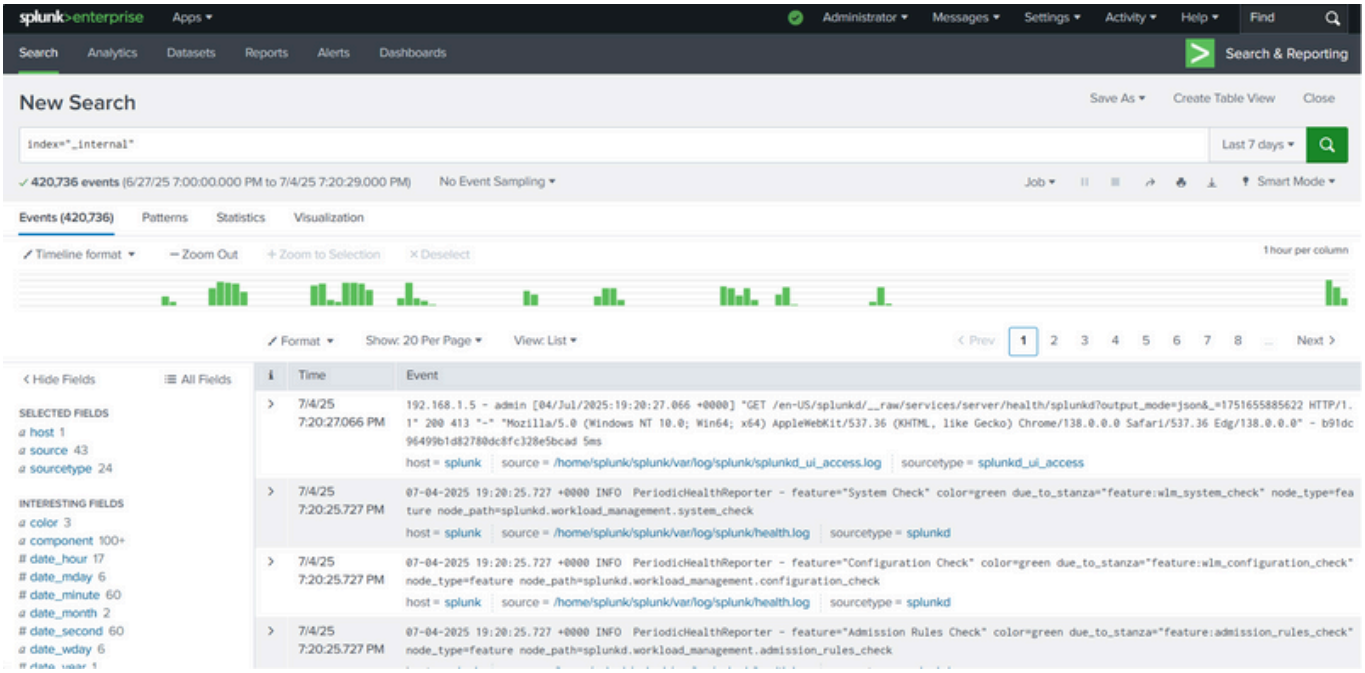
2.1 Accessing the Search Interface

- From the Home Page, click Search & Reporting (usually the first app listed).
- You'll see the Search screen with:
  - A search bar for your queries.
  - A time range picker (default: Last 24 hours).



2.2 Constructing Your Search Query

- **Search Bar:** Type your SPL (Splunk Search Language) queries here.
- **Time Range Picker:** Choose the time frame for your search.



2.3 Understanding Search Results

After running a search, results appear in a table with:

- **Timestamp**: When the event happened.
- **Event Actions**: Options for that event.
  - **Columns**:Type: Category of the field.
  - **Field**: Name of the data point.
  - **Value**: Actual data.
  - **Actions**: Filter or add to search.

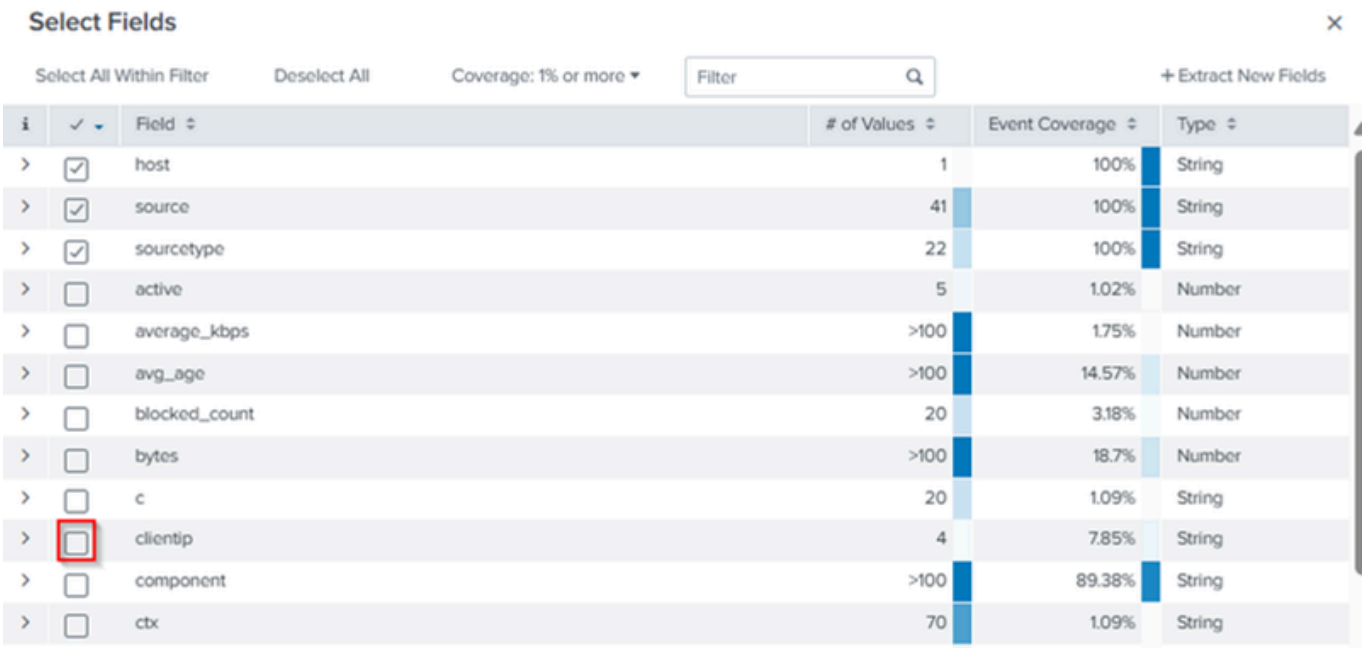
Common fields include:

- host (server name)
- source (file path)
- sourcetype (data format)
- clientip (IP address)
- _time (Splunk timestamp)
- index (where the event is stored)

2.4 Managing Displayed Fields

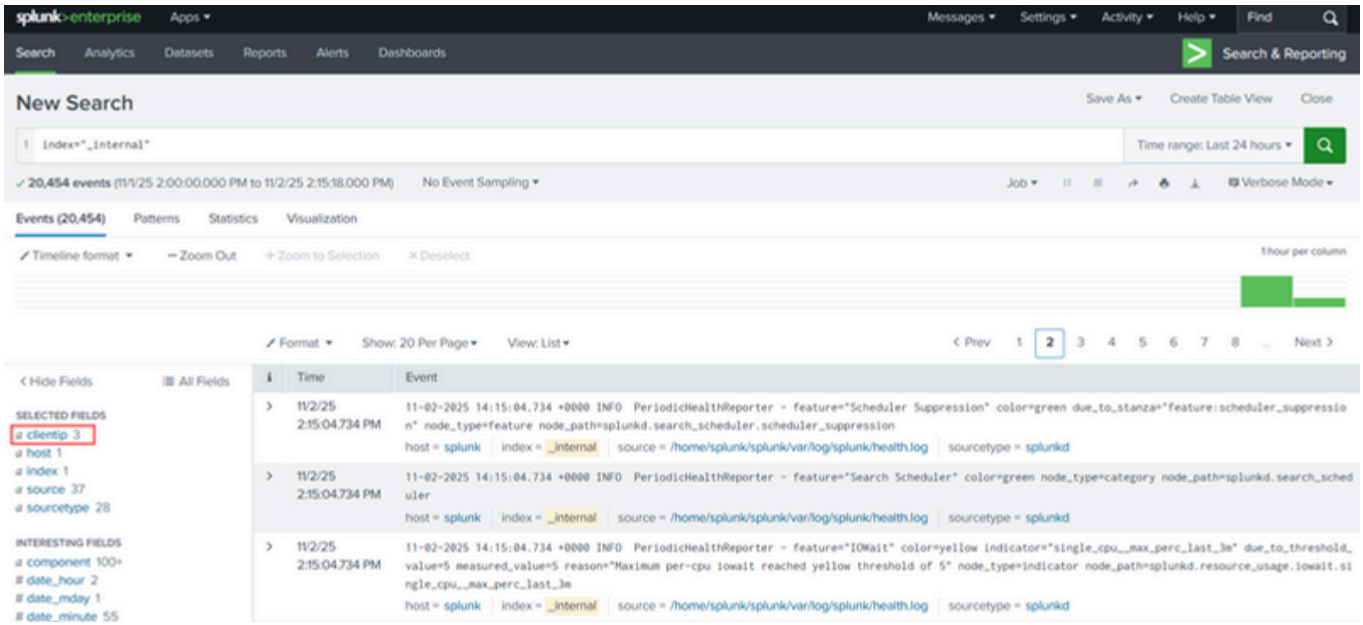
Splunk extracts numerous fields from your data. You can control which fields are shown in the event list.

- Click “647 more fields” to see all fields.



- Use Select Fields dialog to choose which fields to show.

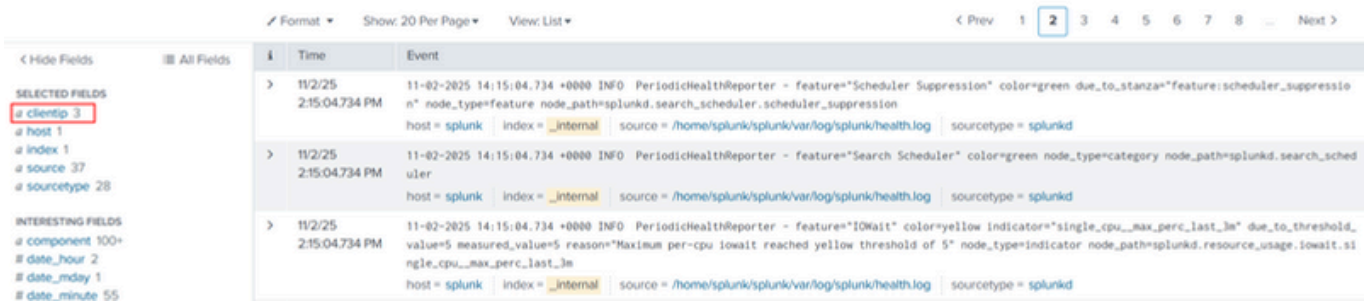
- Example: Selecting clientip makes IP addresses visible.



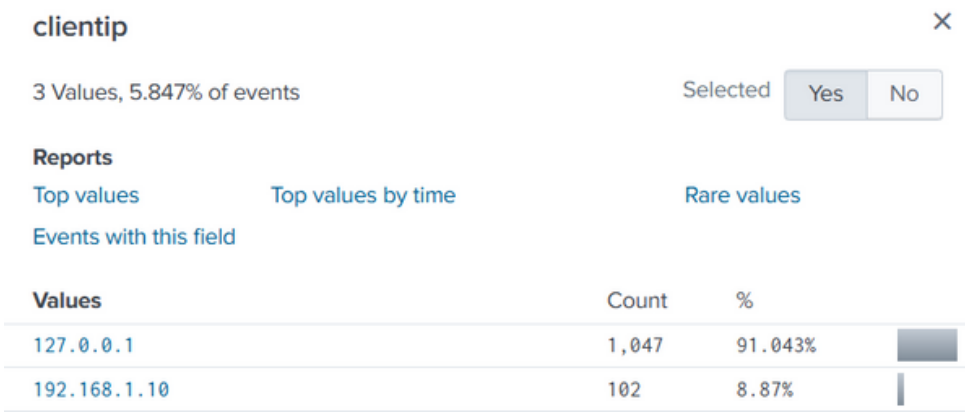
- We can see clientip in the Selected Field

2.5 Filtering and Analyzing Fields

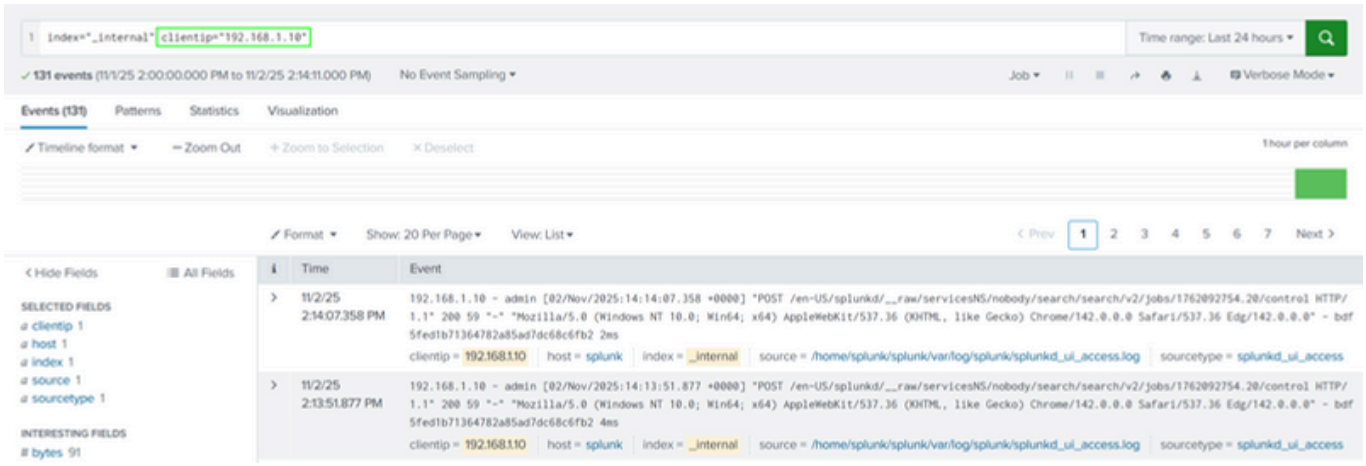
Once fields are displayed, you can further refine your search or explore field values.



- Click a field (e.g., clientip) to see:
  - Summary: Unique values and coverage.
  - Value Distribution: Counts and percentages.



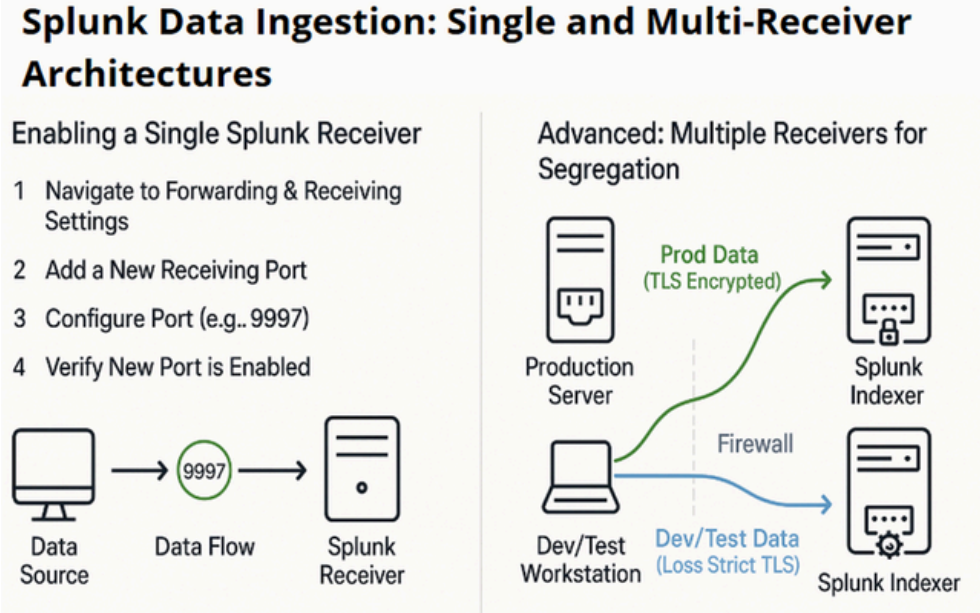
- Use Action Links like:
  - Top values
  - Rare values
  - Events with this field
- Click a value (e.g., 192.168.1.10) to filter your search:



This makes your search more precise and focused.

Enabling the Receiver on Splunk Enterprise

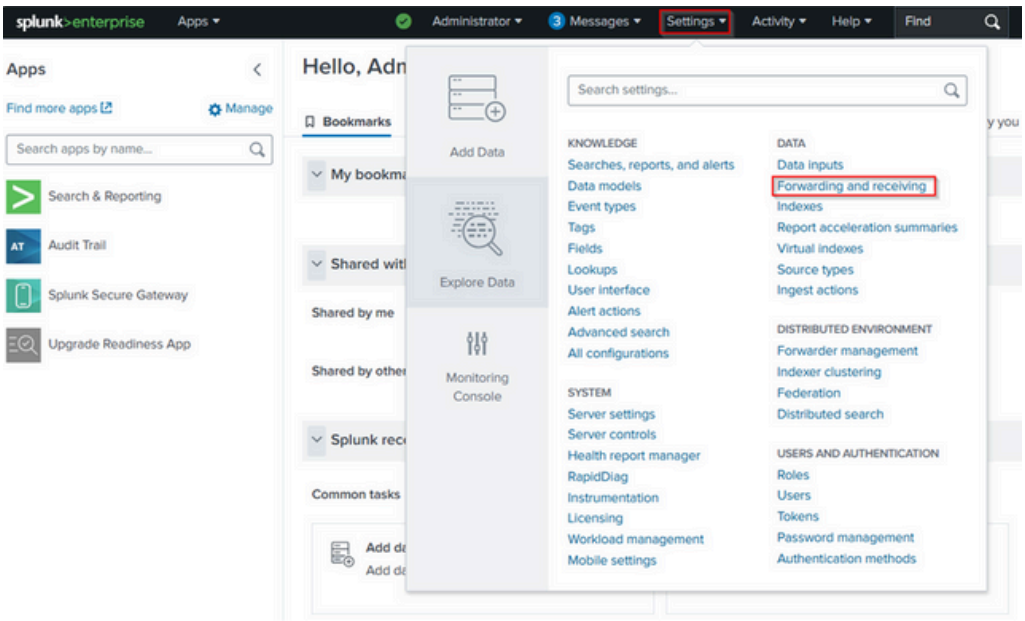
Splunk uses receivers to accept data from forwarders. A receiver is simply a port that listens for incoming data.
Most setups only need one receiver, but you can configure multiple for advanced environments.



Step-by-Step Guide

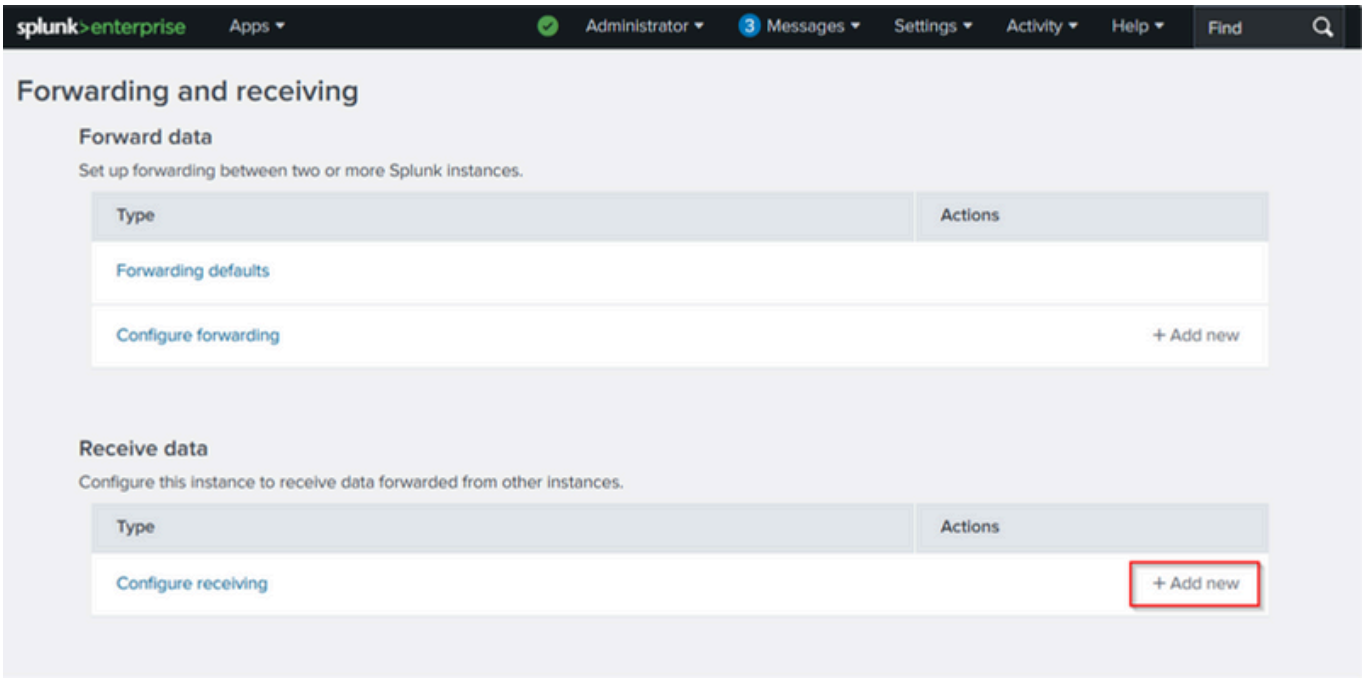
1. Navigate to Settings:

- From the Splunk Home page, click **Settings** → under **Data**, select **Forwarding and Receiving**.



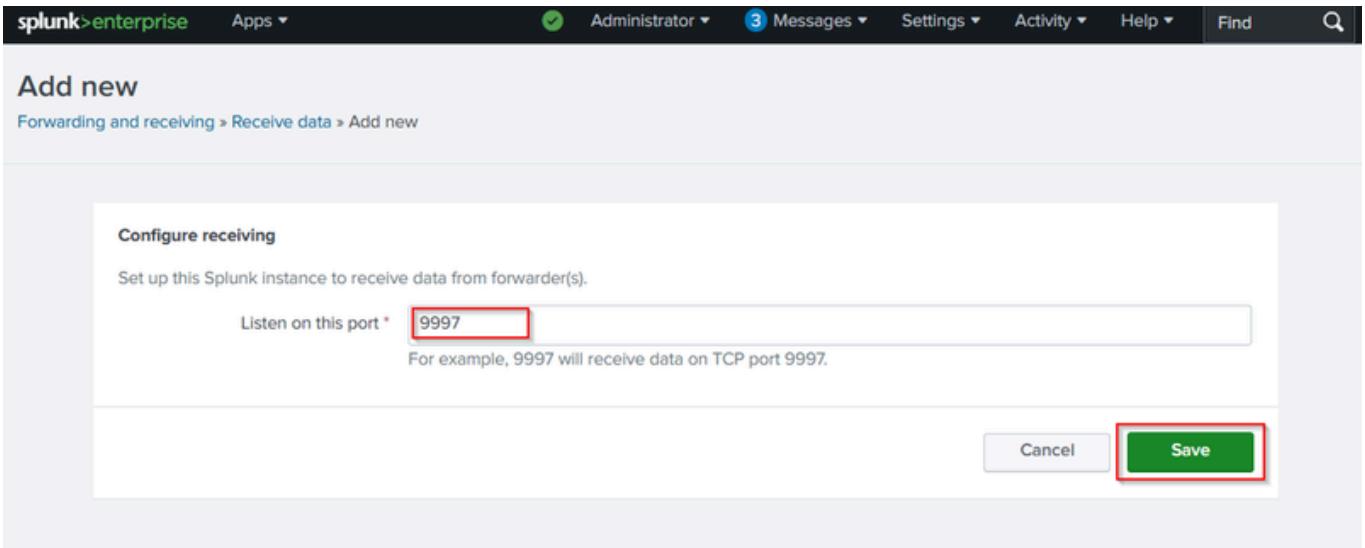
2. Add a New Receiving Port:

- On the **Forwarding and Receiving** page, find **Receive data** and click **+ Add new** next to **Configure receiving**.



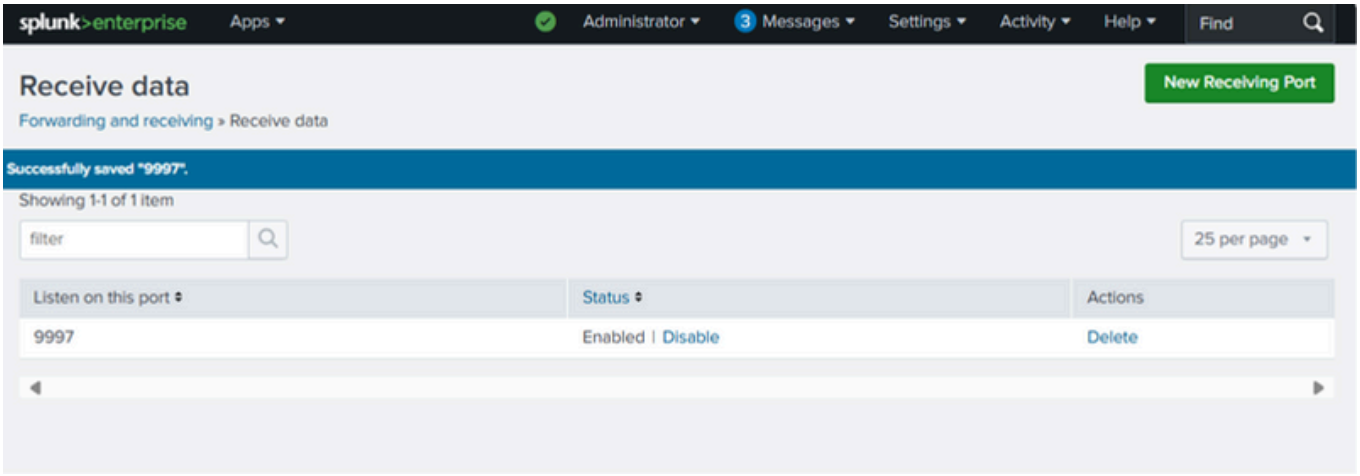
3. Configure the Receiving Port:

- Enter the port number in **Listen on this port** (commonly **9997**).
- Click **Save**.



4. Verify:

- You'll see a confirmation message like: "Successfully saved '9997'."
- The port will appear with **Status: Enabled**.



Understanding Key Configuration Files

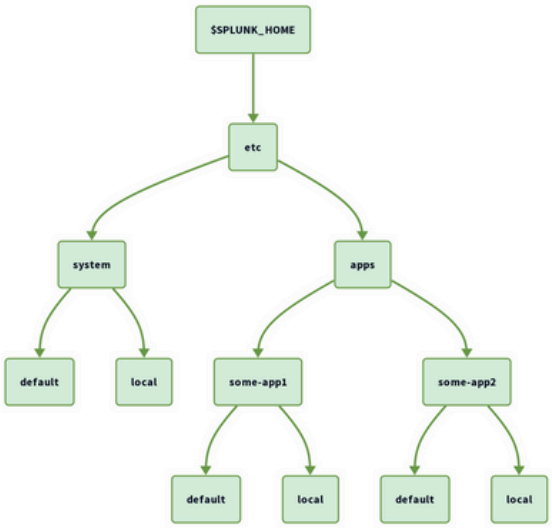
Splunk uses configuration files to control how it works. These files let you manage things like data inputs, parsing rules, server settings, and the web interface. Knowing how they are organized and which file takes priority is essential for administration.

Splunk Configuration File Overview

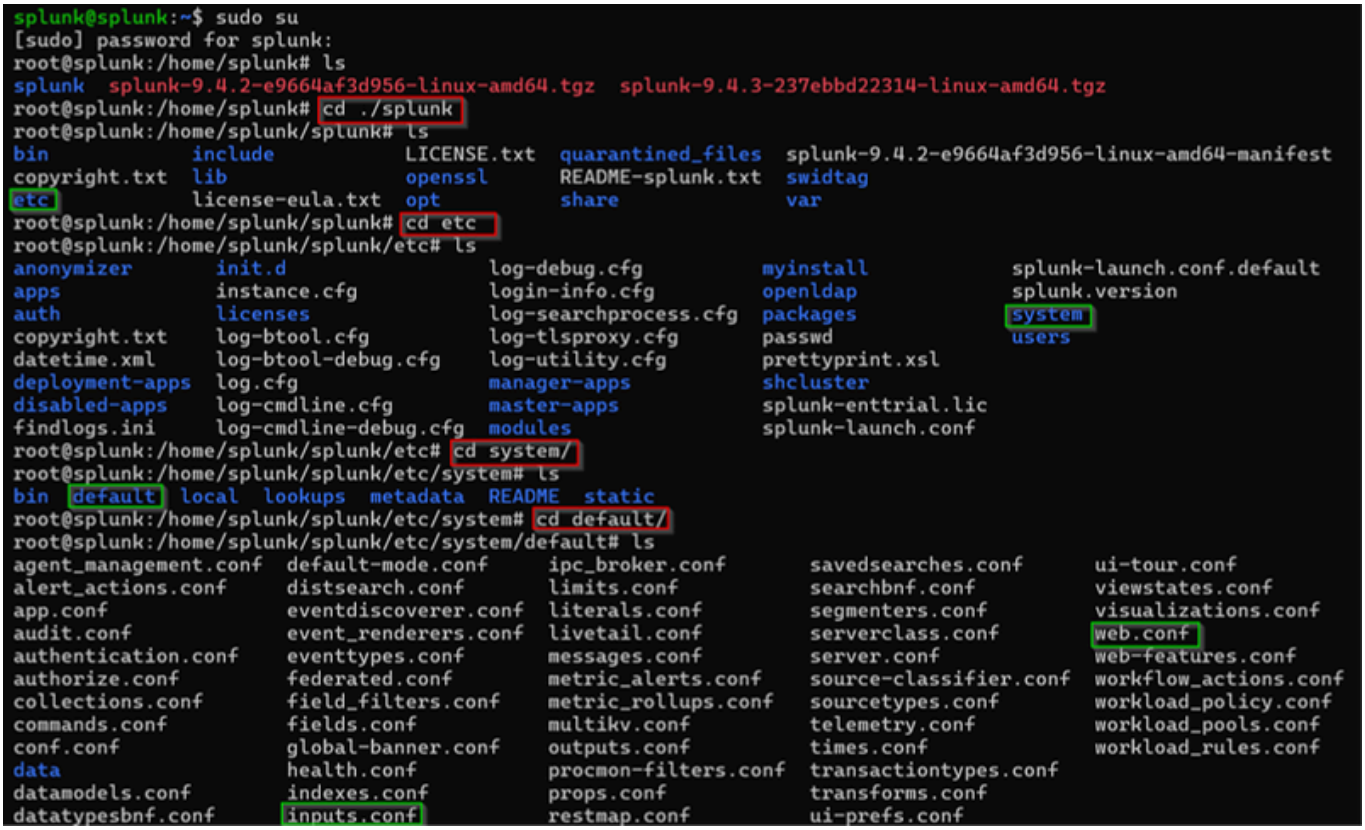
- Splunk settings are stored in **.conf files**, each for a specific purpose:
  - inputs.conf → Data inputs
  - props.conf → Parsing rules
  - transforms.conf → Data transformations
  - server.conf → Server settings
  - web.conf → Web interface
  - indexes.conf → Index settings
- These files are spread across the **$SPLUNK_HOME/etc** directory, not in one place.
- Each file uses **stanzas** (sections in square brackets [ ]) to organize settings.

Navigating Splunk Configuration Directories

- Main directory: $SPLUNK_HOME/etc
- Inside, you'll find:
  - system/ → Global settings
  - apps/ → App-specific settings
- Each has:
  - default/ → Original settings (don't edit here)
  - local/ → Your custom changes (safe to edit)



For instance, within a Splunk installation (e.g., at /home/splunk/splunk), navigating to $SPLUNK_HOME/etc/system/default reveals a collection of default configuration files:



Understanding Configuration File Precedence

When Splunk starts, it merges all files with the same name. If there's a conflict, this is the priority (highest to lowest):

1. $SPLUNK_HOME/etc/system/local
2. $SPLUNK_HOME/etc/apps/<app>/local
3. $SPLUNK_HOME/etc/apps/<app>/default
4. $SPLUNK_HOME/etc/system/default

Tip: Always make changes in local/ directories, not default.

Example: web.conf

The web.conf file controls **Splunk's web interface settings**.

```
root@splunk:/home/splunk/splunk/etc/system/default# nano web.conf
```

```
  GNU nano 6.2                                                    web.conf
#   Version 9.4.2
# DO NOT EDIT THIS FILE!
# Changes to default files will be lost on update and are difficult to
# manage and support.
#
# Please make any changes to system defaults by overriding them in
# apps or $SPLUNK_HOME/etc/system/local
# (See "Configuration file precedence" in the web documentation).
#
# To override a specific setting, copy the name of the stanza and
# setting to the file where you wish to override it.
#
# This file contains possible attributes and values you can use to configure Splunk's web interface.
#

[default]


[settings]

# enable/disable the appserver
startwebserver = 1

# port number tag is missing or 0 the server will NOT start an http listener
# this is the port used for both SSL and non-SSL (we only have 1 port now).
httpport = 8000

# this determines whether to start SplunkWeb in http or https.
enableSplunkWebSSL = false

# location of splunkd; don't include http[s]:// in this anymore.
mgmtHostPort = 127.0.0.1:8089

# list of ports to start python application servers on (although usually
# one port is enough)
#
# In the past a special value of "0" could be passed here to disable
# the modern UI appserver infrastructure, but that is no longer supported.
appServerPorts = 8065

# default timeout, in seconds, when communicating with splunkd
splunkdConnectionTimeout = 30

# enable/disable custom netloc when using http client
enableSplunkWebClientNetloc = False

# SSL certificate files.
privKeyPath = $SPLUNK_HOME/etc/auth/splunkweb/privkey.pem
serverCert = $SPLUNK_HOME/etc/auth/splunkweb/cert.pem
```

What this means:

- startwebserver = true → Splunk Web will start.
- httpport = 8000 → The web interface runs on port 8000.
- enableSplunkWebSSL = false → SSL is disabled (not secure).

Different locations might have different values:

Location	Settings
$SPLUNK_HOME/etc/system/local/web.conf	enableSplunkWebSSL = true
$SPLUNK_HOME/etc/apps/some-app/local/web.conf	(none)
$SPLUNK_HOME/etc/apps/some-app/default/web.conf	httpport = 443
$SPLUNK_HOME/etc/system/default/web.conf	startwebserver = true httpport = 8000 enableSplunkWebSSL = false

Final Effective Settings

- startwebserver = true (from system/default, not overridden)
- httpport = 443 (from app/default, overrides default)
- enableSplunkWebSSL = true (from system/local, highest priority)

Why this matters:

- Always make changes in local/ directories, not default.
- This ensures your settings persist after upgrades and follow best practices.

Understanding and Installing Splunk Apps

Splunk apps are packages that extend Splunk's functionality. They can add dashboards, reports, integrations, and more.

1. What Are Splunk Apps?

- **Self-contained packages** (e.g., .tgz, .tar.gz) that enhance Splunk Enterprise or Universal Forwarder.
- **What they do:**
  - **Enhance Data Processing:** Add field extractions and parsing rules.
  - **Provide Visualizations:** Dashboards, charts, and reports.
  - **Enable Integrations:** Connect Splunk with external tools.
  - **Streamline Operations:** Pre-built alerts and dashboards.

App Directory Structure

- bin/ → Scripts and custom code.
- default/ → Default configs (don't edit here).
- local/ → Your custom changes (safe to edit).
- lookups/ → Lookup tables for enrichment.
- metadata/ → Permissions and metadata.
- static/ → Icons and images.

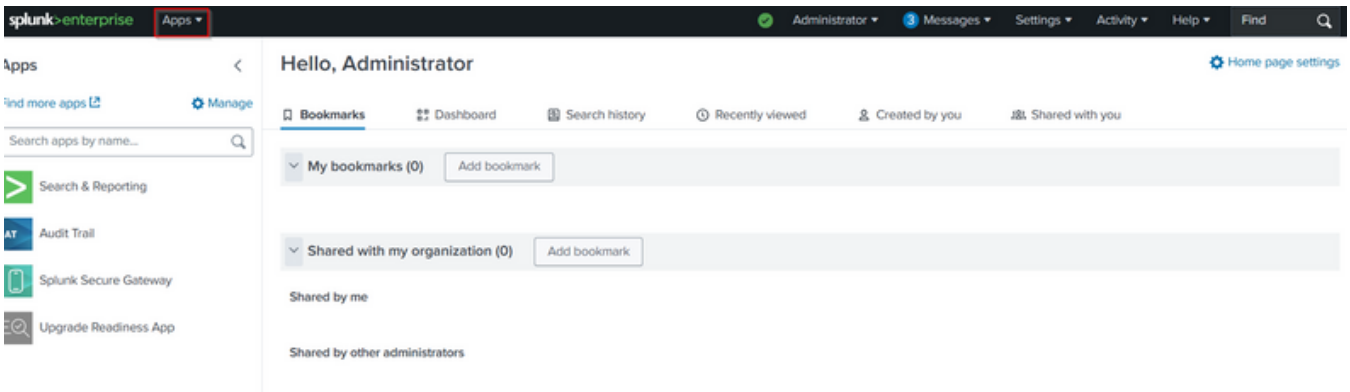
2. Installing Splunk Apps

Two main methods:

2.1 Installation via Splunk Web Interface

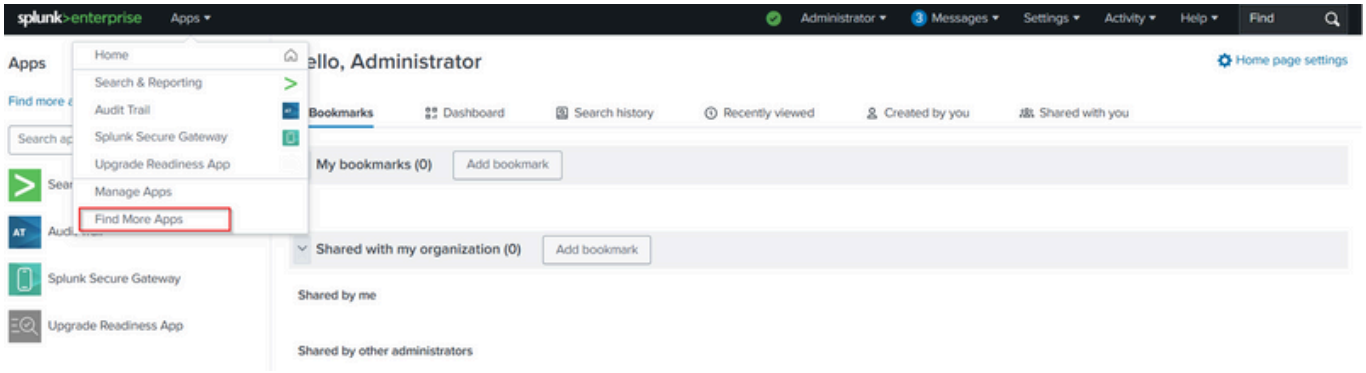
Steps:

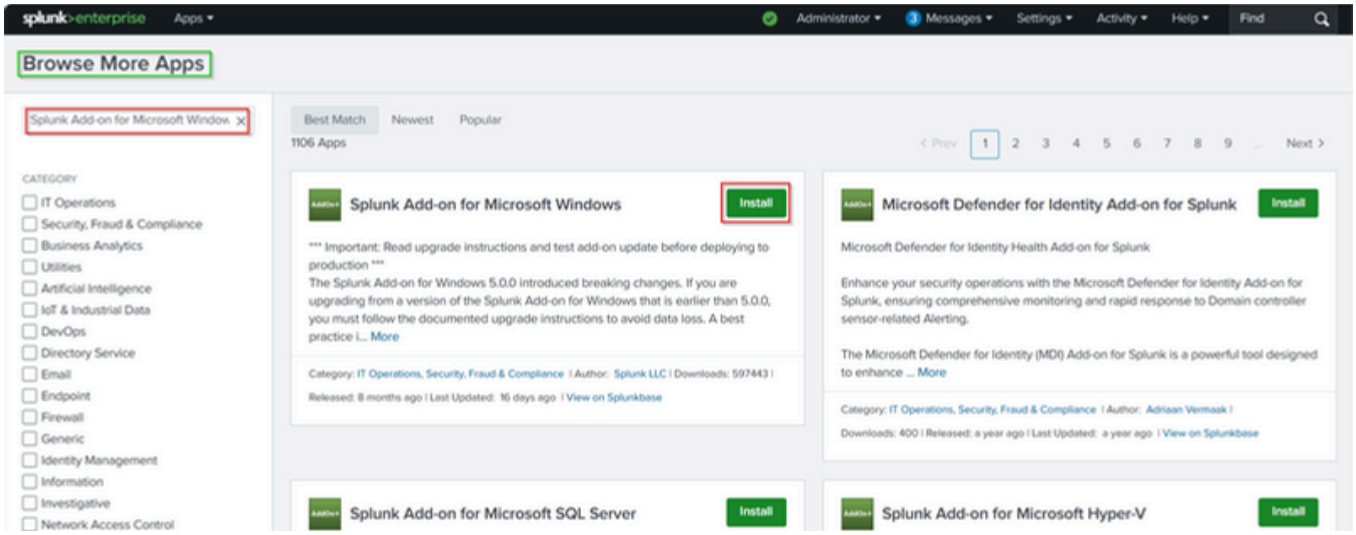
1. **Access App Management:** Go to **Apps** from the Splunk homepage.

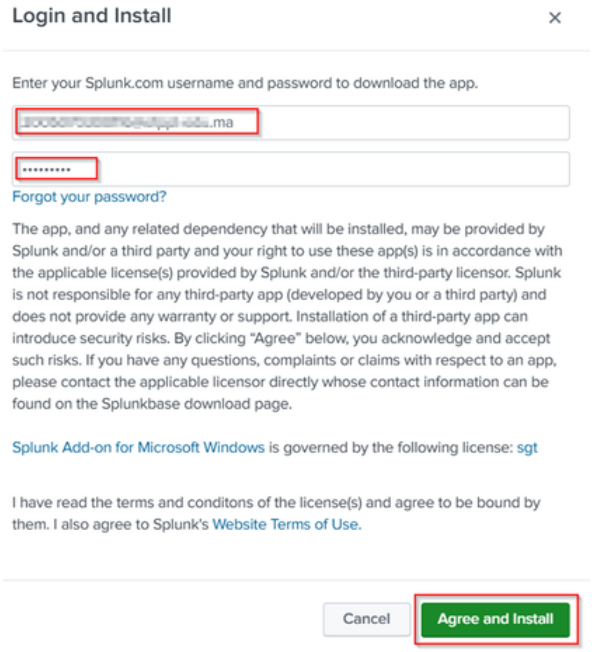


2. Choose Installation Method:

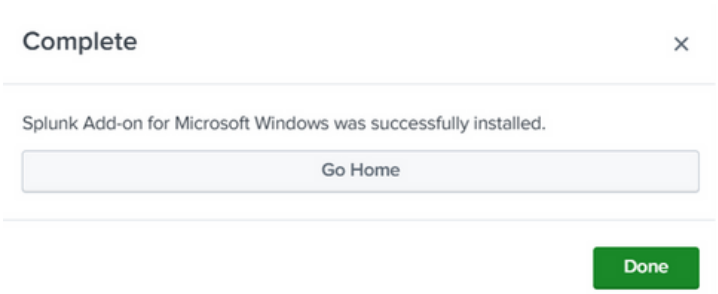
- Browse More Apps (Splunkbase): Search and install directly.
- Install from File: Upload a .tgz file.







3. **Upload and Install:** Splunk processes the package.
4. **Completion:** Confirmation message appears. Some apps may require a restart.



2.2 Verify Installation

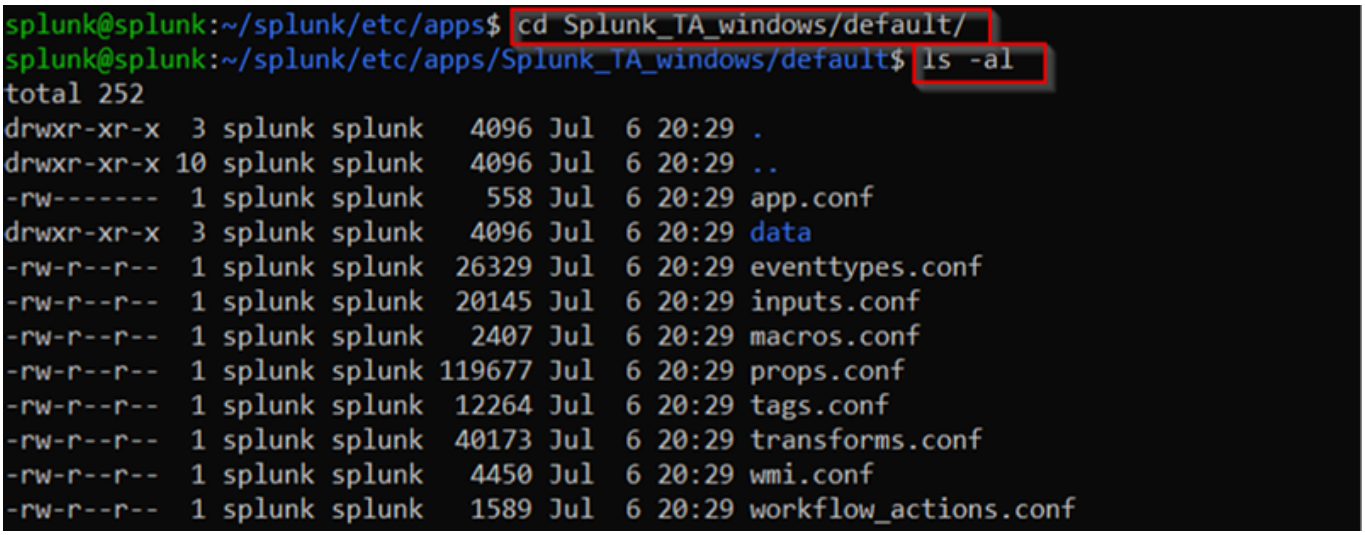
- On the server:

```
splunk@splunk:~$ cd ./splunk/etc/apps
```

- Use ls -al to list installed apps.

```
splunk@splunk:~/splunk/etc/apps$ ls -al
total 124
drwxr-xr-x 31 splunk splunk 4096 Jul  6 20:29 .
drwxr-xr-x 18 splunk splunk 4096 Jul  6 19:42 ..
drwxr-xr-x  7 splunk splunk 4096 Mar 18 22:42 alert_logevent
drwxr-xr-x  7 splunk splunk 4096 Mar 18 22:42 alert_webhook
drwxr-xr-x  4 splunk splunk 4096 Mar 18 22:42 appsbrowser
drwxr-xr-x  6 splunk splunk 4096 Mar 18 22:42 audit_trail
drwxr-xr-x  5 splunk splunk 4096 Mar 18 22:42 introspection_generator_addon
drwxr-xr-x  4 splunk splunk 4096 Mar 18 22:42 journald_input
drwxr-xr-x  7 splunk splunk 4096 Mar 18 22:42 launcher
drwxr-xr-x  5 splunk splunk 4096 Jun 28 13:49 learned
drwxr-xr-x  4 splunk splunk 4096 Mar 18 22:42 legacy
drwxr-xr-x  9 splunk splunk 4096 Jun 28 20:12 python_upgrade_readiness_app
drwxr-xr-x  6 splunk splunk 4096 Mar 18 22:42 sample_app
drwxr-xr-x  8 splunk splunk 4096 Mar 18 22:42 search
drwxr-xr-x  6 splunk splunk 4096 Jun 28 19:41 splunk_archiver
drwxr-xr-x  9 splunk splunk 4096 Jun 28 13:49 splunk-dashboard-studio
drwxr-xr-x  4 splunk splunk 4096 Mar 18 22:42 SplunkDeploymentServerConfig
drwxr-xr-x  4 splunk splunk 4096 Mar 18 22:42 SplunkForwarder
drwxr-xr-x  7 splunk splunk 4096 Mar 18 22:45 splunk_gdi
drwxr-xr-x  3 splunk splunk 4096 Mar 18 22:42 splunk_httpinput
drwxr-xr-x  9 splunk splunk 4096 Jun 28 13:49 splunk_instrumentation
drwxr-xr-x  4 splunk splunk 4096 Mar 18 22:42 splunk_internal_metrics
drwxr-xr-x  4 splunk splunk 4096 Mar 18 22:42 SplunkLightForwarder
drwxr-xr-x  8 splunk splunk 4096 Mar 18 22:44 splunk_metrics_workspace
drwxr-xr-x  8 splunk splunk 4096 Jun 28 13:49 splunk_monitoring_console
drwxr-xr-x 10 splunk splunk 4096 Jul  5 16:43 splunk_rapid_diag
drwxr-xr-x  8 splunk splunk 4096 Jul 19  2024 splunk-rolling-upgrade
drwxr-xr-x 10 splunk splunk 4096 Feb 18 16:04 splunk_secure_gateway
drwxr-xr-x 10 splunk splunk 4096 Jul  6 20:29 Splunk_TA_windows
drwxr-xr-x  5 splunk splunk 4096 Nov 12  2024 splunk-visual-exporter
drwxr-xr-x  4 splunk splunk 4096 Mar 18 22:42 user-prefs
```

- Explore default/ for original configs and local/ for custom changes.



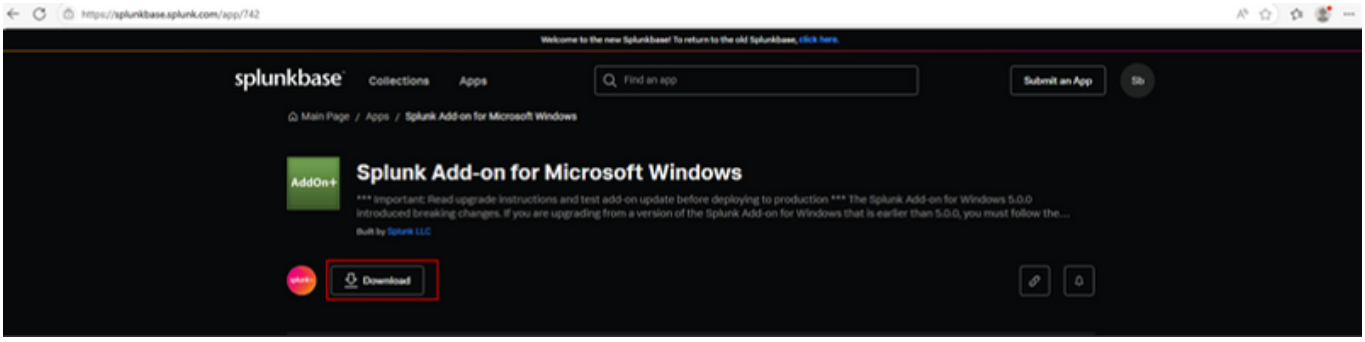
Best Practice: Always edit in local/, never in default/.

Shipping Windows Event Logs into Splunk

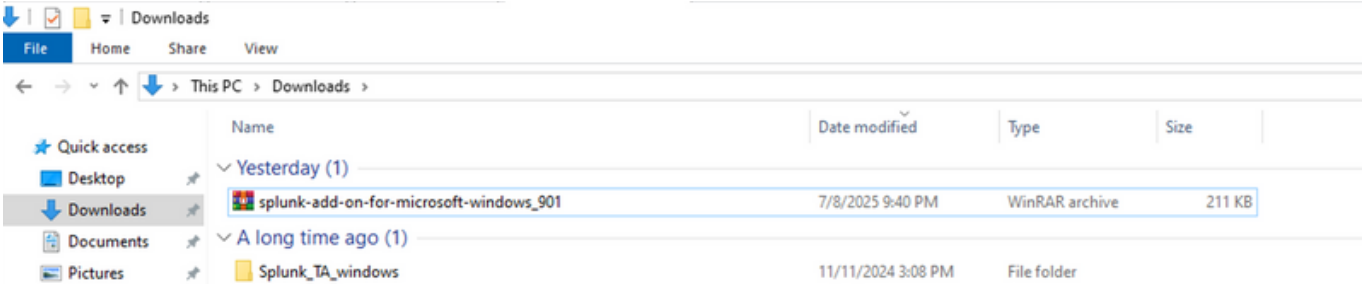
To collect Windows event logs and send them to Splunk, you use a Splunk Universal Forwarder with the Splunk Add-on for Microsoft Windows.

Step 1: Download the Add-on

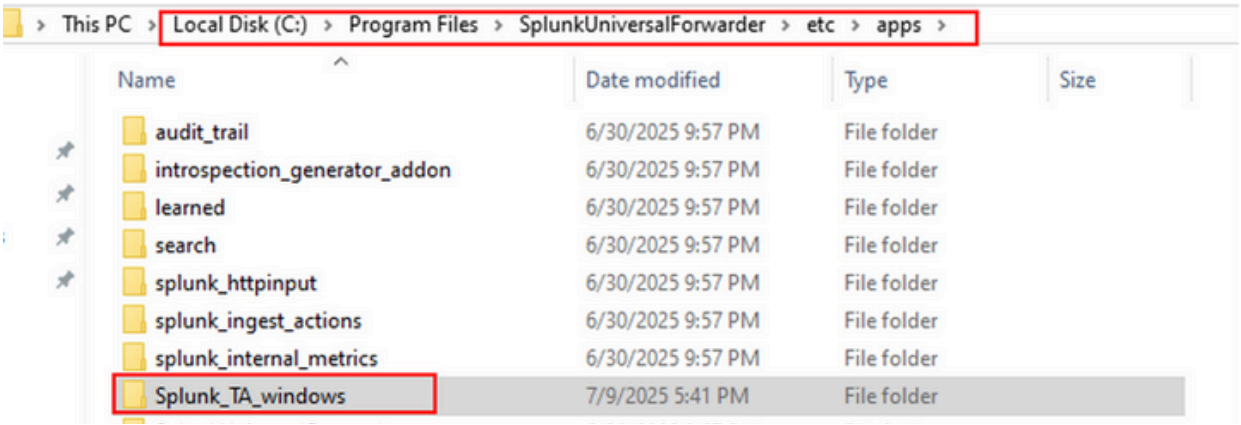
- Go to Splunkbase (https://splunkbase.splunk.com/app/742) and download **Splunk Add-on for Microsoft Windows**.



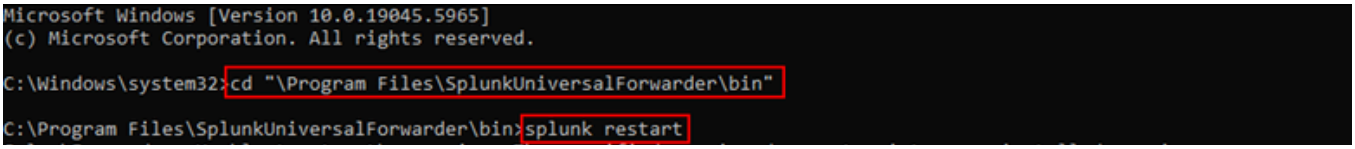
- Extract it to:



- Make sure the folder name is:



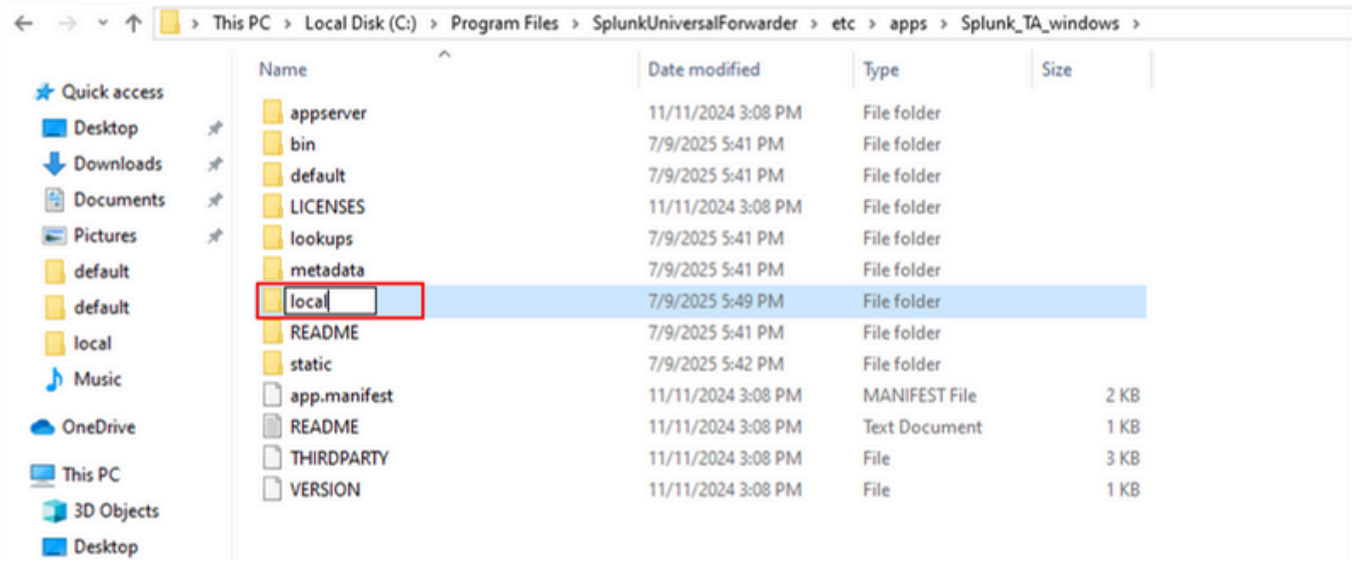
- Restart



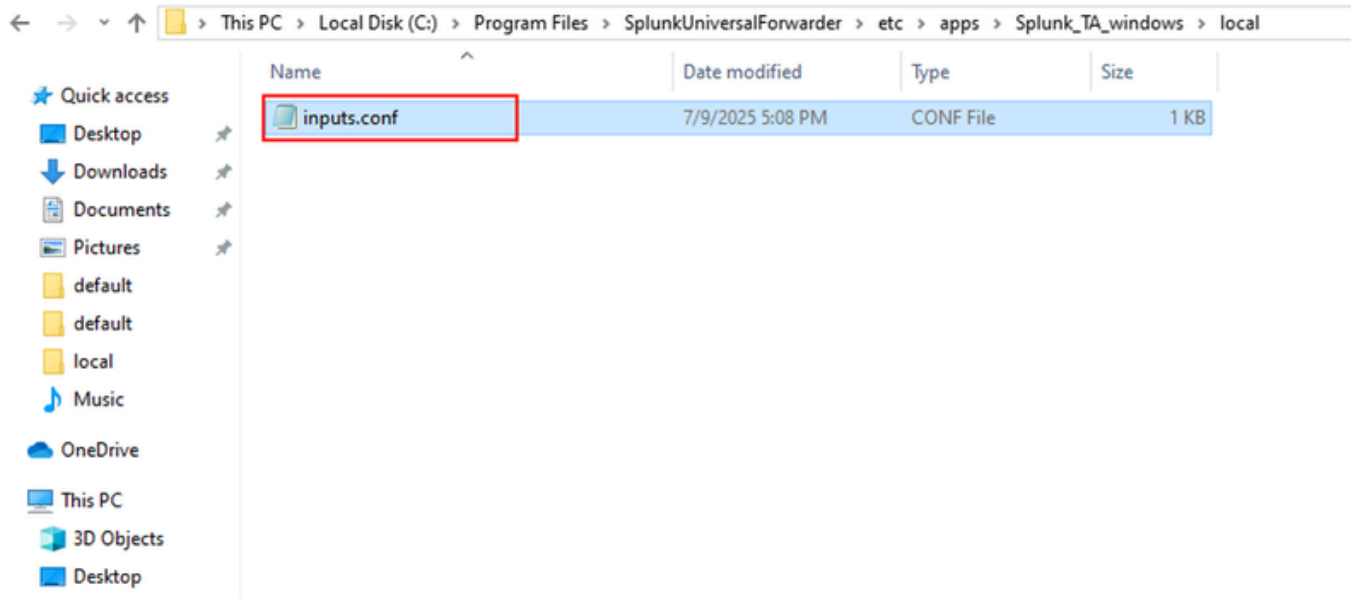
Step 2: Configure inputs.conf

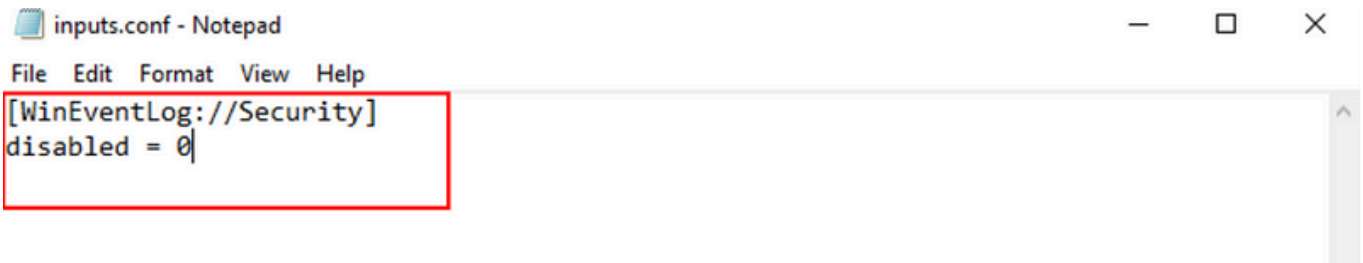
- Path:

C:\Program Files\SplunkUniversalForwarder\etc\apps\Splunk_TA_windows\local\



- Open inputs.conf and add:



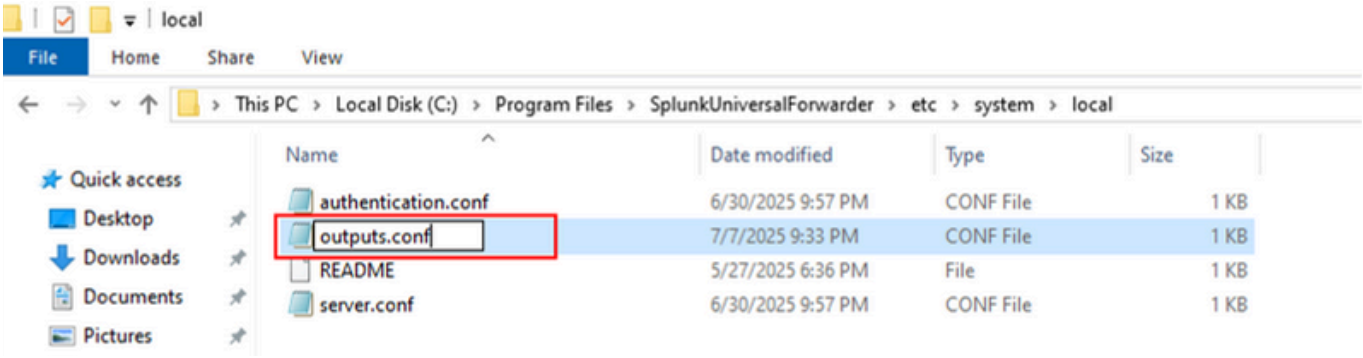


- This enables collection of Windows Security event logs.

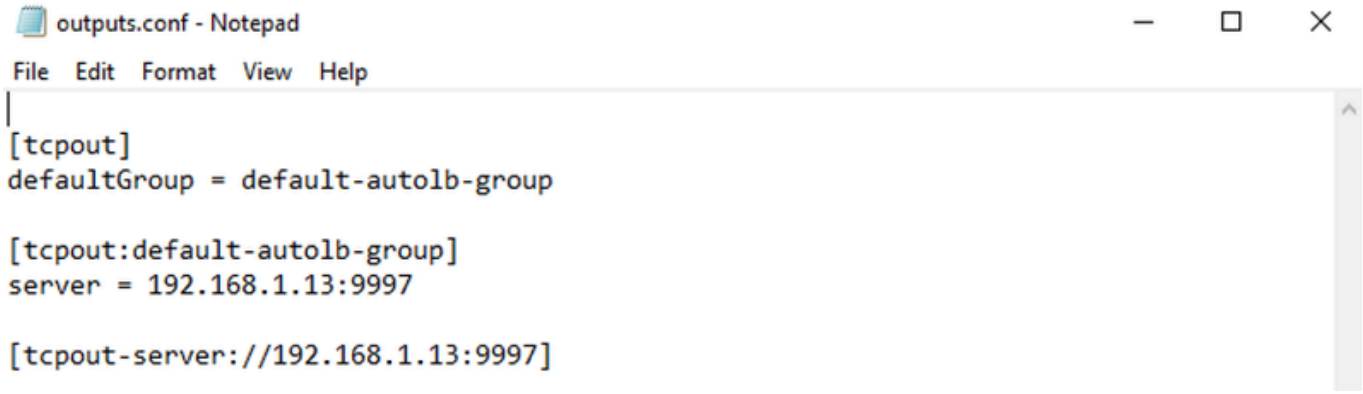
Step 3: Configure outputs.conf

- Path:

C:\Program Files\SplunkUniversalForwarder\etc\system\local\



- Open outputs.conf and add:



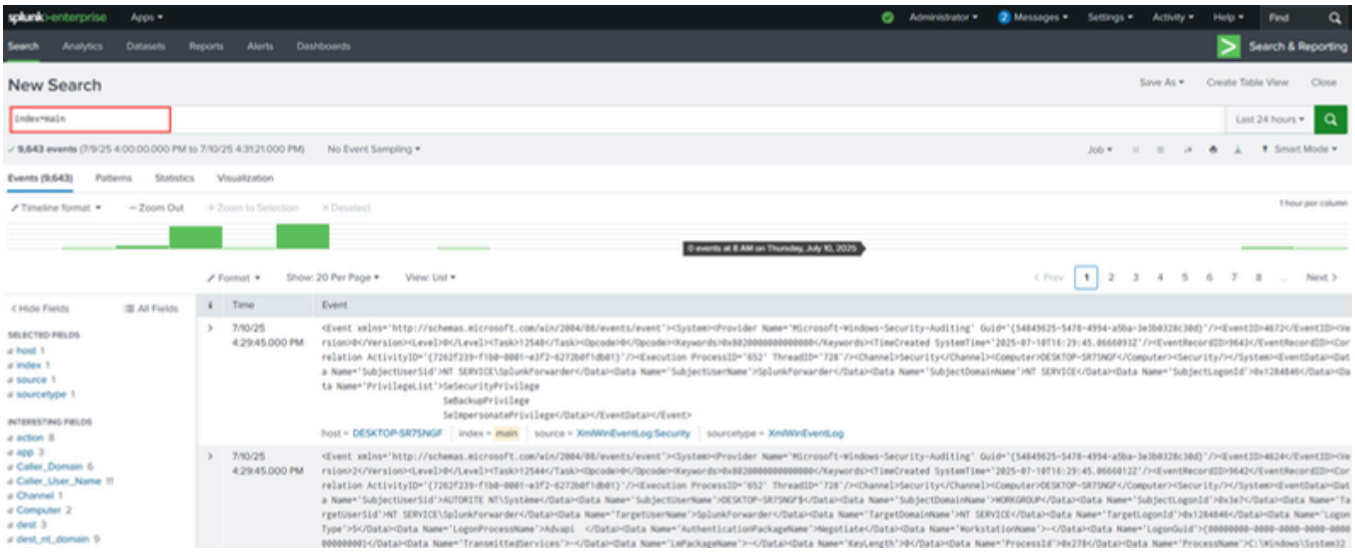
  - Replace 192.168.1.13 with your Splunk indexer IP and 9997 with the receiving port.

Step 4: Restart the Forwarder

- Open Command Prompt (Admin):

Step 5: Verify in Splunk

- In Splunk Web, search:



If events appear, your setup is successful.

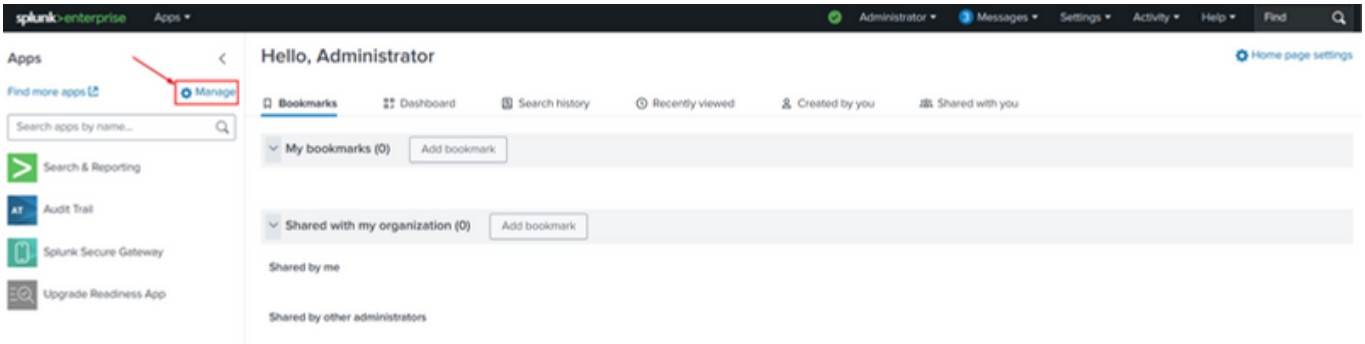
Establishing a Dedicated Index for Testing Data

When working with custom data or lab environments, it's best to create a dedicated index. This keeps test data separate from production and makes cleanup easier.

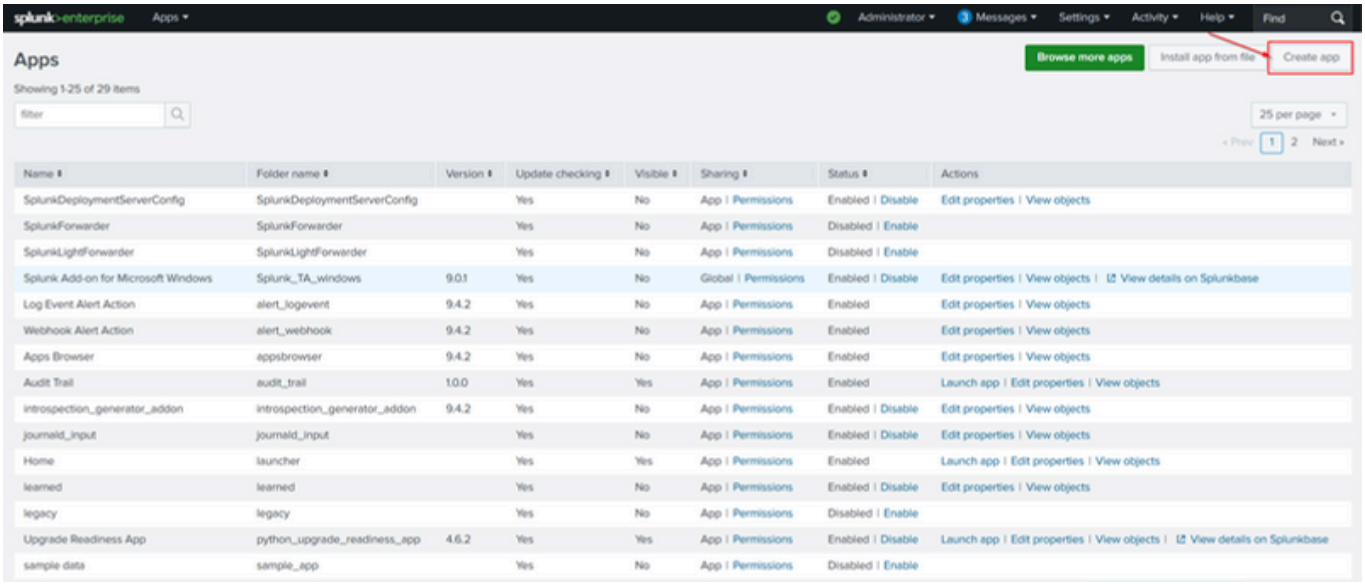
1. Creating a New Splunk App

To better organize your custom configurations, it's recommended to create a dedicated Splunk app.

1. Go to **Manage**: In Splunk Web (browser interface), click Manage.

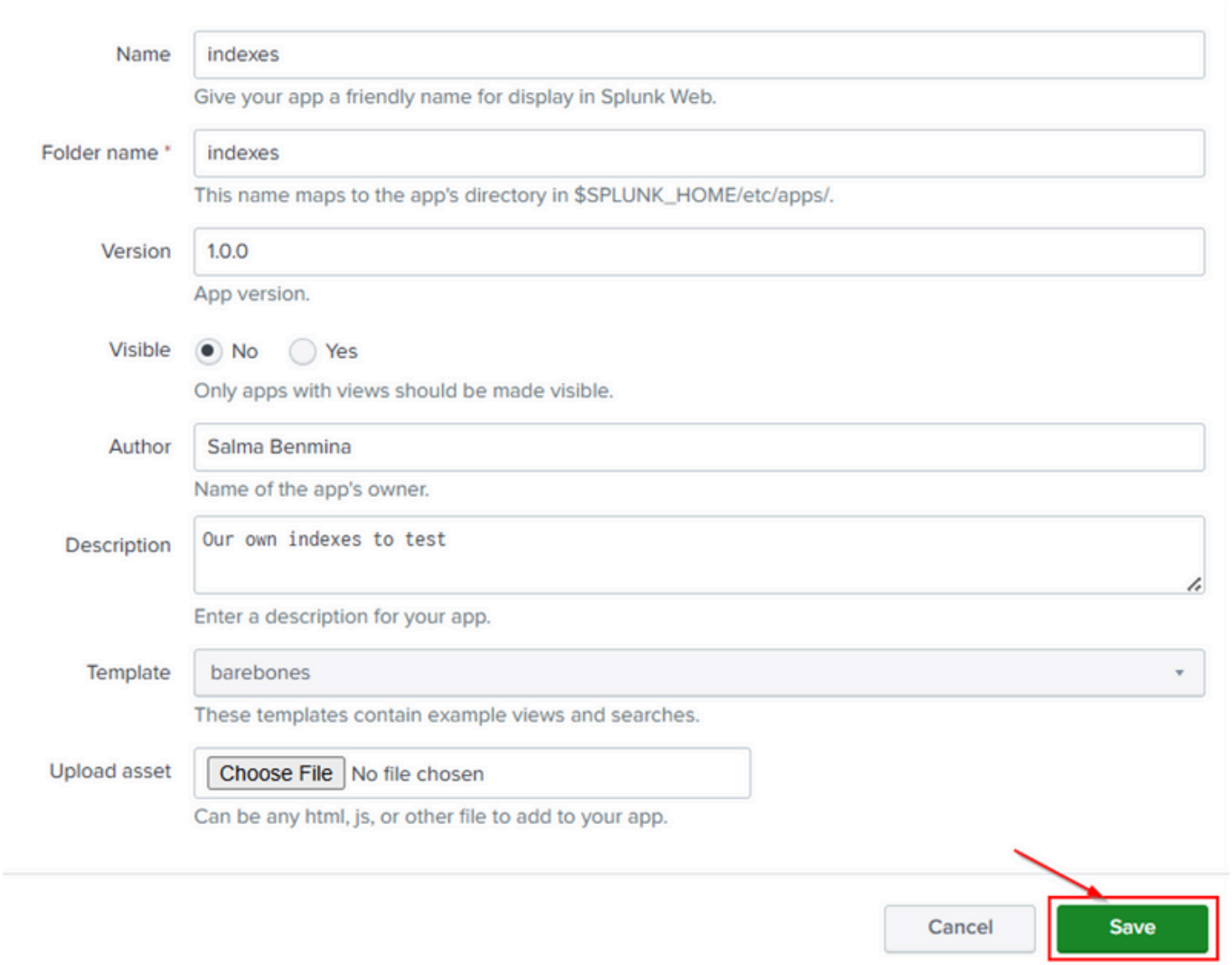


2. Click "**Create App**".

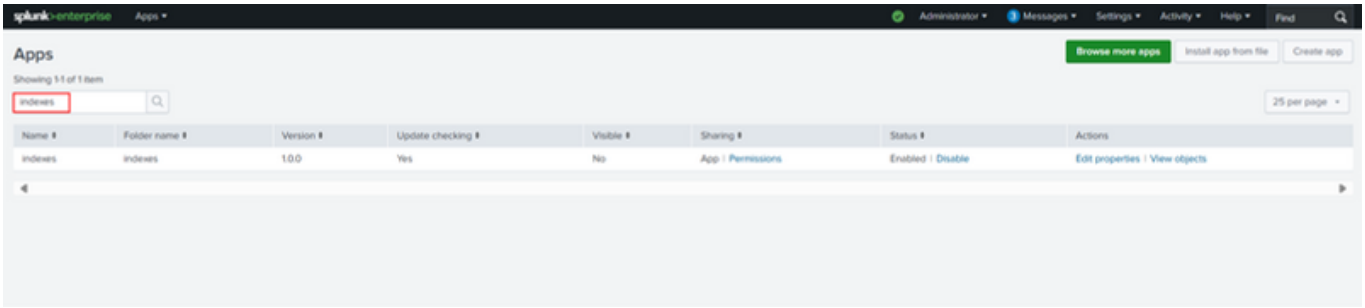


3. Fill the form like this:

- Folder name: indexes
- Version: 1.0.0
- Visible: No (because it has no views/pages)
- Author: Thomas Fellinger
- Description: Our own indexes to test
- Template: barebones
- Upload asset: Leave it empty



4. Click **Save** to finish creating the app.



2. Check the App Configuration

After creating the app, you can check its settings using the command line (terminal).

Steps:

1. **Go to the app folder** on your server.

```
splunk@splunk:~/splunk/etc/apps$ ls -al | grep indexes
drwx--x---  6 splunk splunk 4096 Jul  8 19:42 indexes
splunk@splunk:~/splunk/etc/apps$ cd indexes/
splunk@splunk:~/splunk/etc/apps/indexes$ ls -al
total 24
drwx--x---  6 splunk splunk 4096 Jul  8 19:42 .
drwxr-xr-x 33 splunk splunk 4096 Jul  8 19:42 ..
drwx--x---  2 splunk splunk 4096 Jul  8 19:42 bin
drwx--x---  3 splunk splunk 4096 Jul  8 19:42 default
drwx------  2 splunk splunk 4096 Jul  8 19:42 local
drwx--x---  2 splunk splunk 4096 Jul  8 19:42 metadata
splunk@splunk:~/splunk/etc/apps/indexes$ cd default/
splunk@splunk:~/splunk/etc/apps/indexes/default$ ls -al
total 16
drwx--x--- 3 splunk splunk 4096 Jul  8 19:42 .
drwx--x--- 6 splunk splunk 4096 Jul  8 19:42 ..
-rw------- 1 splunk splunk  193 Jul  8 19:42 app.conf
drwx--x--- 3 splunk splunk 4096 Jul  8 19:42 data
```

2. **Open app.conf file,** this file shows the details you entered when creating the app.

```
splunk@splunk:~/splunk/etc/apps/indexes/default$ cat app.conf
#
# Splunk app configuration file
#

[install]
is_configured = 0

[ui]
is_visible = 0
label = indexes

[launcher]
author = Salma Benmina
description = Our own indexes to test
version = 1.0.0
```

3. Create a New Index (Using Configuration File)

An index is where Splunk stores data.

Steps:

1. Inside your app folder, go to the default directory.
2. Create or edit a file called indexes.conf.

```
splunk@splunk:~/splunk/etc/apps/indexes/default$ nano indexes.conf
```

3. Add this configuration to define a new index called test:

```
  GNU nano 6.2                                          indexes.conf *
[test]
homePath = $SPLUNK_DB/$_index_name/db
coldPath = $SPLUNK_DB/$_index_name/colddb
thawedPath = $SPLUNK_DB/test/thaweddb
```

- **[test]**: Defines a new index named test.
- **homePath**: Where hot/warm data is stored.
- **coldPath**: Where cold data is stored.
- **thawedPath**: Where restored (thawed) data is stored.

4. Restart Splunk

To apply the new index settings, you need to restart Splunk.

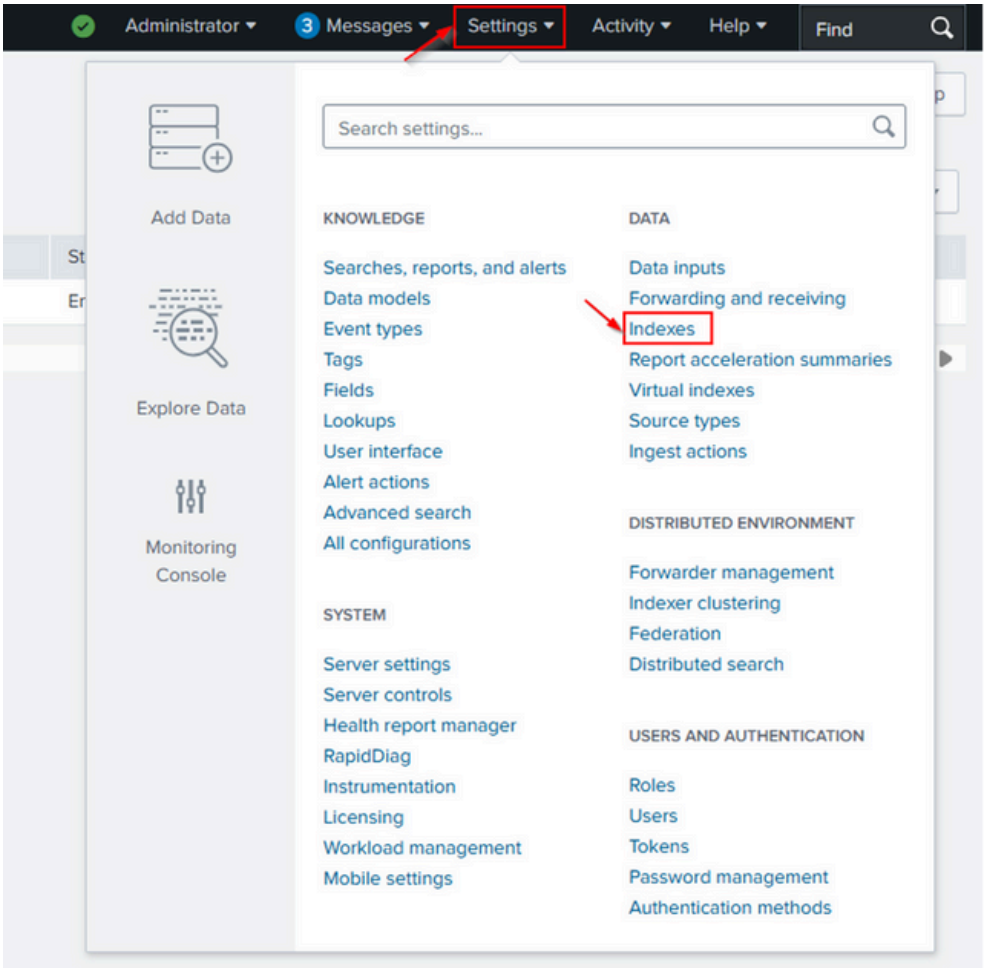
```
splunk@splunk:~/splunk/bin$ ./splunk restart
Stopping splunkd...
Shutting down.  Please wait, as this may take a few minutes.
==== AUTHENTICATING FOR org.freedesktop.systemd1.manage-units ===
Authentication is required to stop 'Splunkd.service'.
Authenticating as: splunk
Password:
==== AUTHENTICATION COMPLETE ===

Stopping splunk helpers...

Done.
splunkd.pid doesn't exist...

Splunk> Winning the War on Error

Checking prerequisites...
        Checking http port [8000]: open
        Checking mgmt port [8089]: open
        Checking appserver port [127.0.0.1:8065]: open
        Checking kvstore port [8191]: open
        Checking configuration... Done.
        Checking critical directories...        Done
        Checking indexes...
                Validated: _audit _configtracker _dsappevent _dsclient _dsphonehome _internal _introspection _metrics _m
etrics_rollup _telemetry _thefishbucket history main summary test
        Done
        Checking filesystem compatibility...  Done
        Checking conf files for problems...
```

- You'll be asked for your password to confirm the restart.

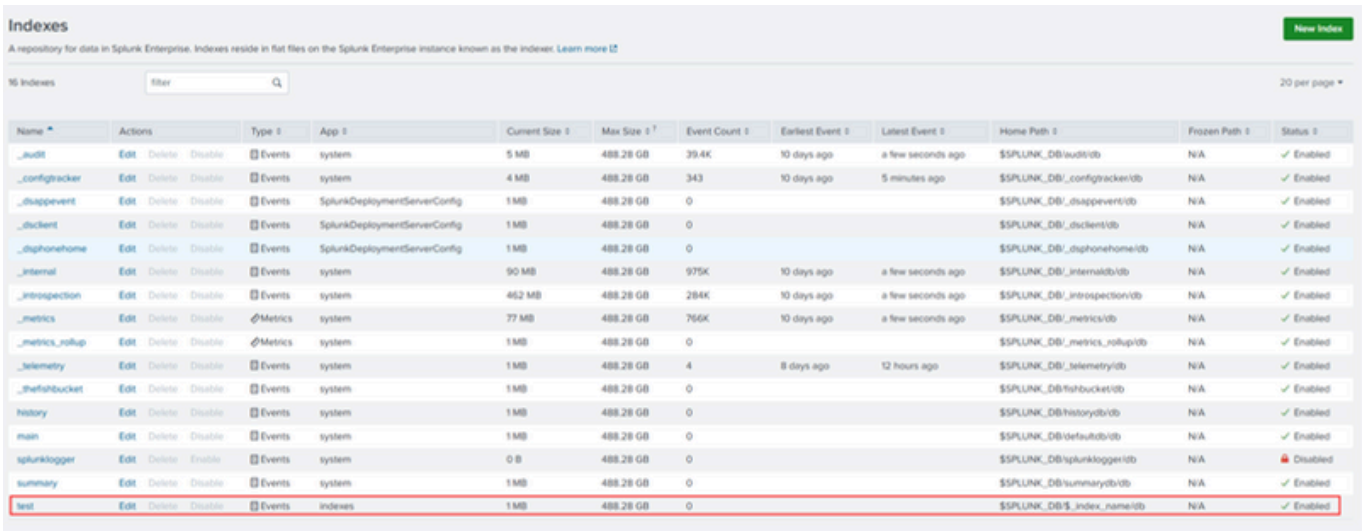
5. Check the New Index in Splunk Web

After restart:

1. Go to **Settings** > **Indexes** in Splunk Web.



2. You should see the new index called test listed there.

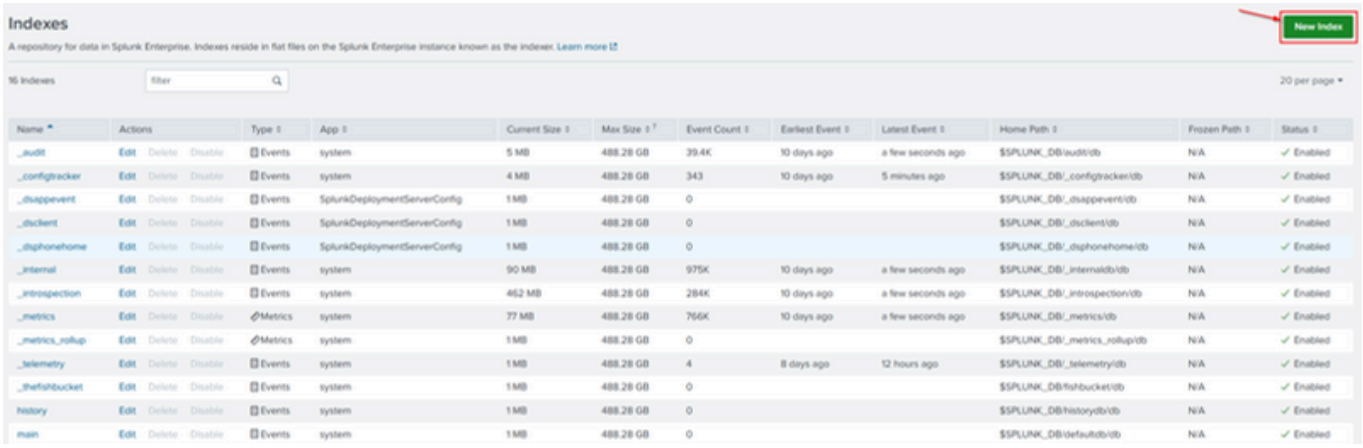


6. Create a New Index Manually (Alternative Method)

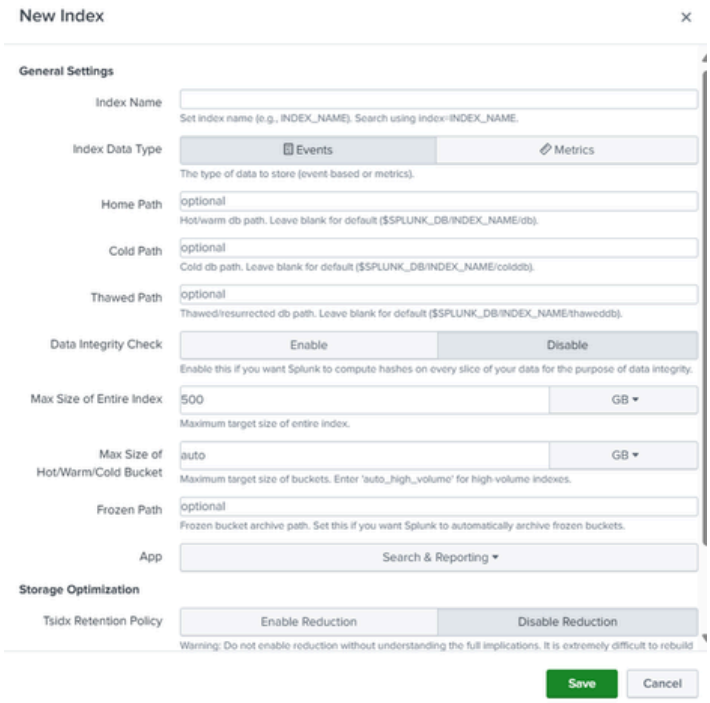
You can also create an index directly from the Splunk Web interface — no need to edit files.

Steps:

1. Go to **Settings** > **Indexes** in Splunk Web.
2. Click "**New Index**".



3. Fill in the form:
   - **Index Name**: Type the name you want (e.g., test)
   - **Index Data** Type: Choose Events or Metrics
   - **Home Path / Cold Path / Thawed Path**: You can leave them empty to use default paths, or set custom ones.
   - **Data Integrity Check**: Turn it on or off depending on your needs.
4. Click **Save** to create the index.



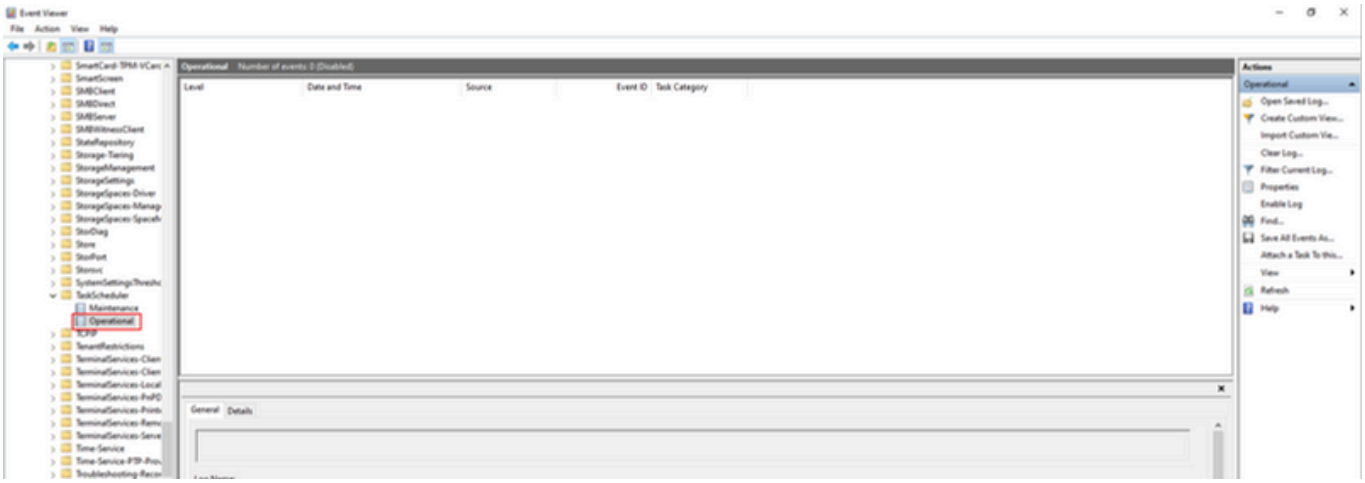
Ingesting Exported Windows Event Log Files

This guide shows how to collect Windows Task Scheduler logs and send them to Splunk using the Universal Forwarder.

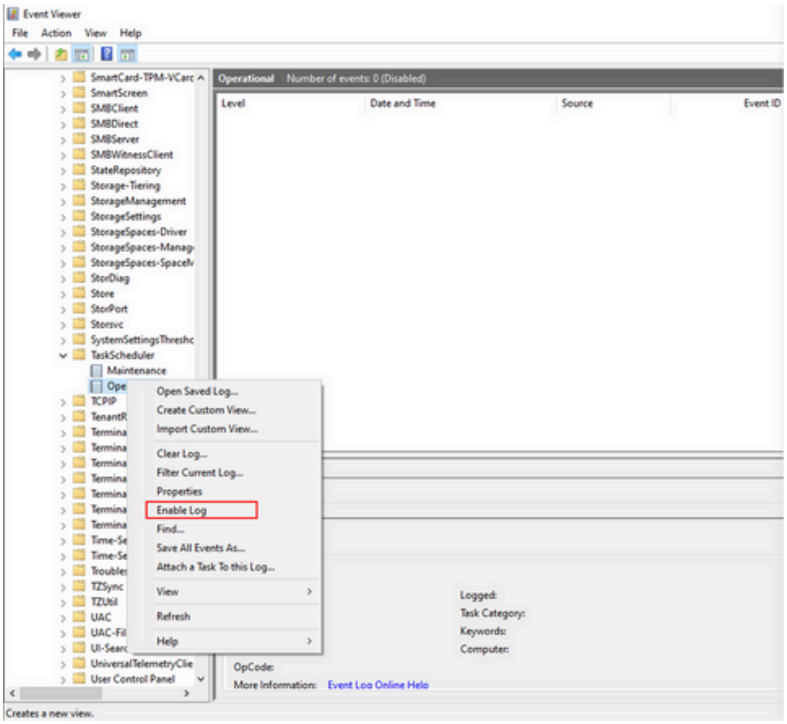
1. Enable Task Scheduler Logs

To collect detailed logs from Task Scheduler:

- Open Event Viewer (search for it in Windows).
- Go to: Applications and Services Logs > Microsoft > Windows > TaskScheduler



- Right-click **Operational** and choose **Enable Log**.

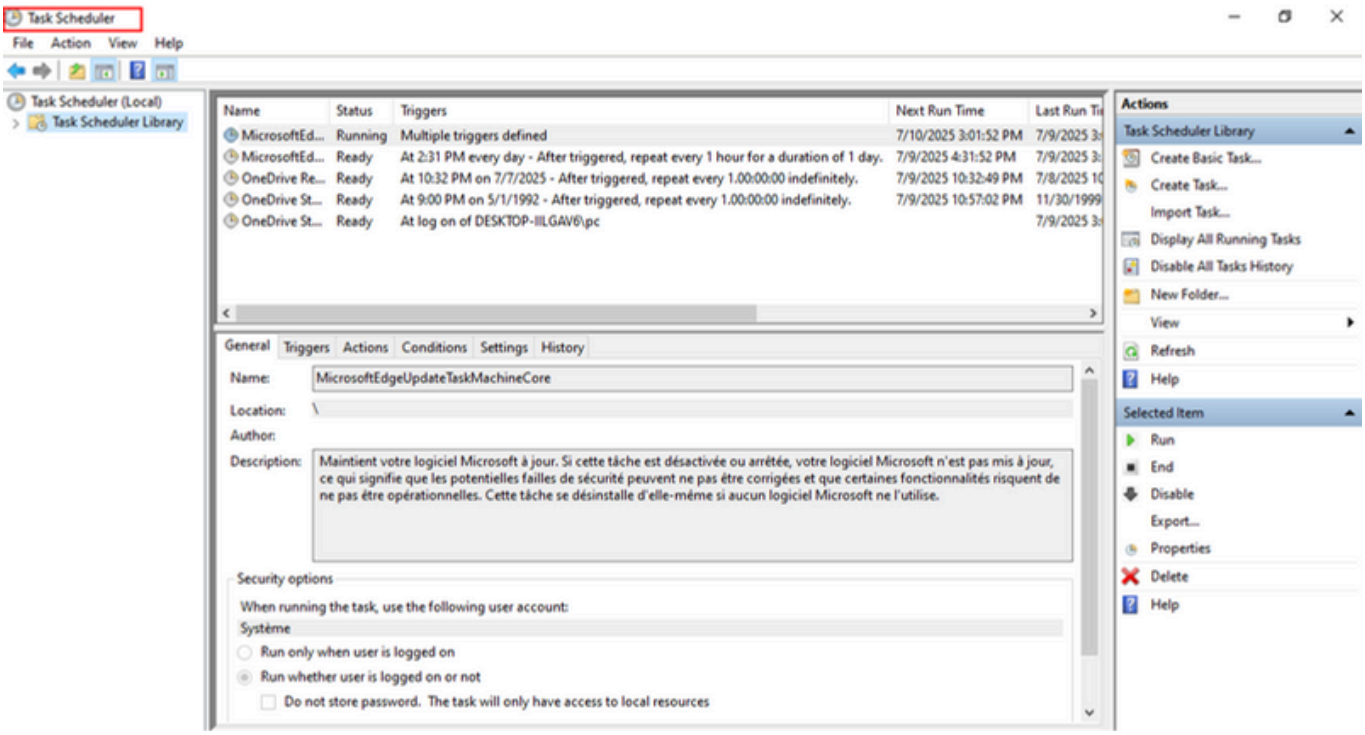


2. Simulate Persistence with a Scheduled Task

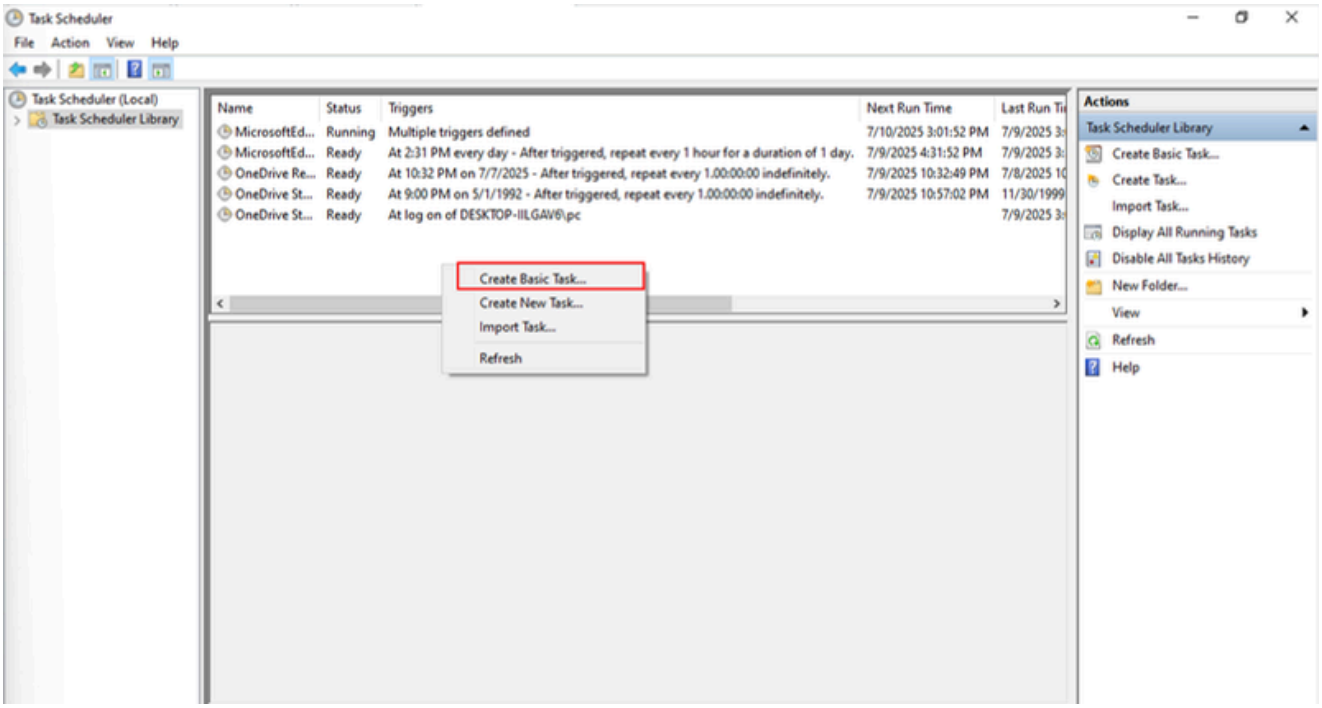
This step creates a fake scheduled task to simulate persistence (like malware staying active).

Steps:

1. Open **Task Scheduler**.

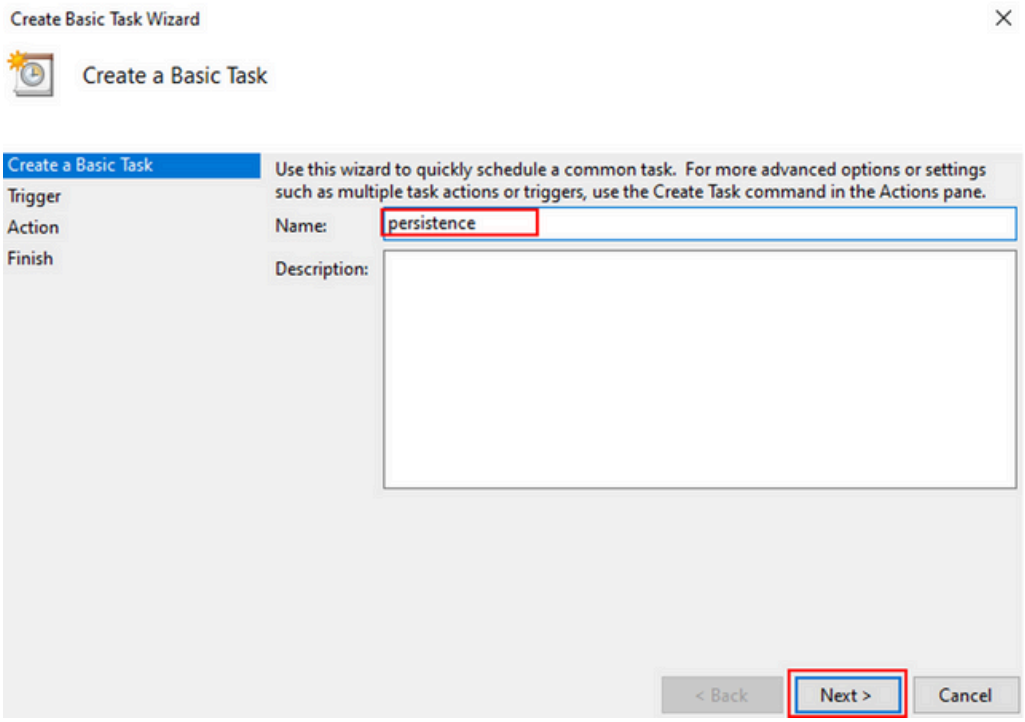


2. Click **Create Basic Task.**

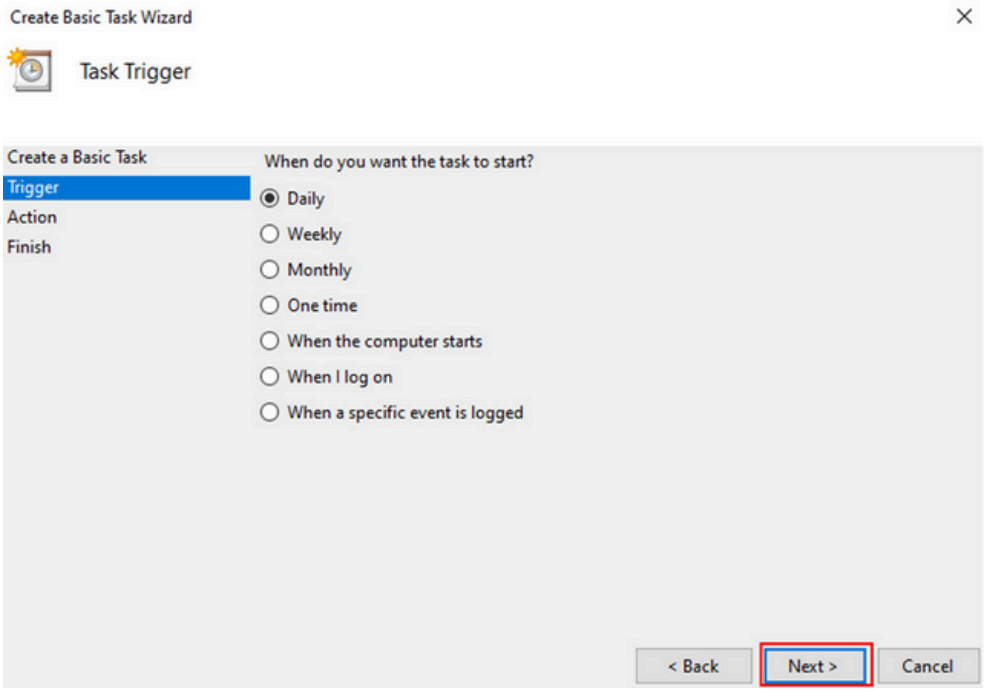


3. In the wizard:

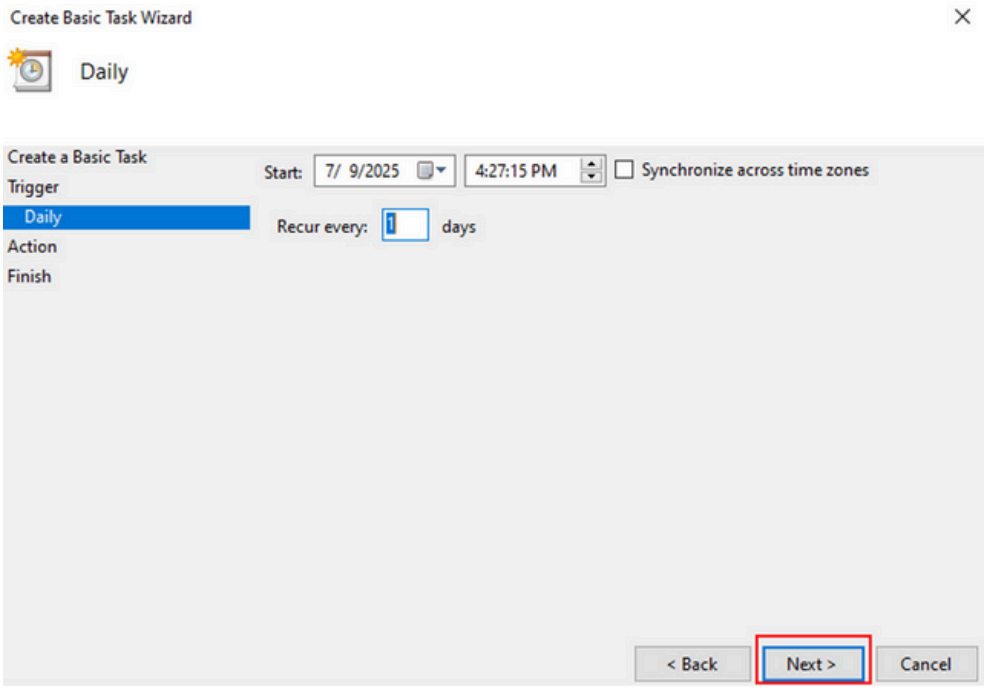
- **Name**: persistence



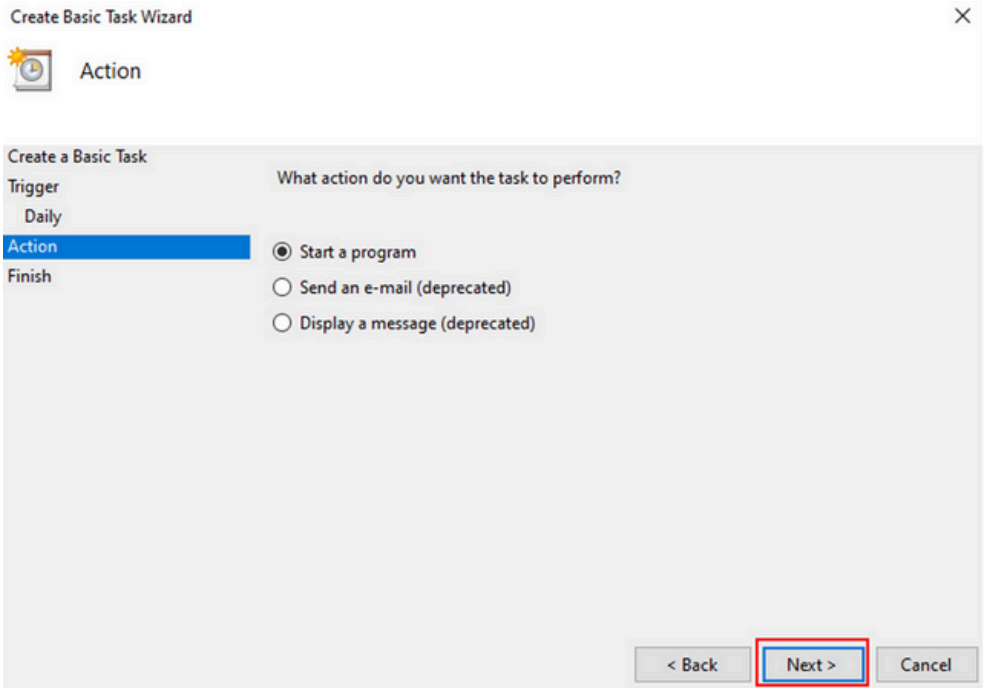
- **Trigger**: Daily



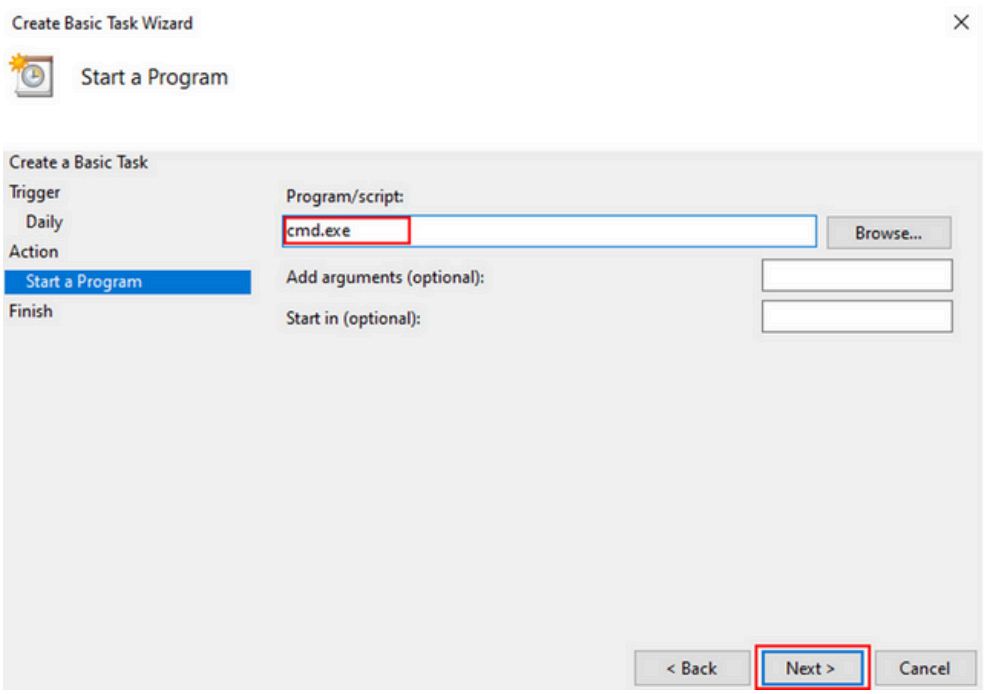
- **Start time**: Choose any time



- **Action**: Start a program

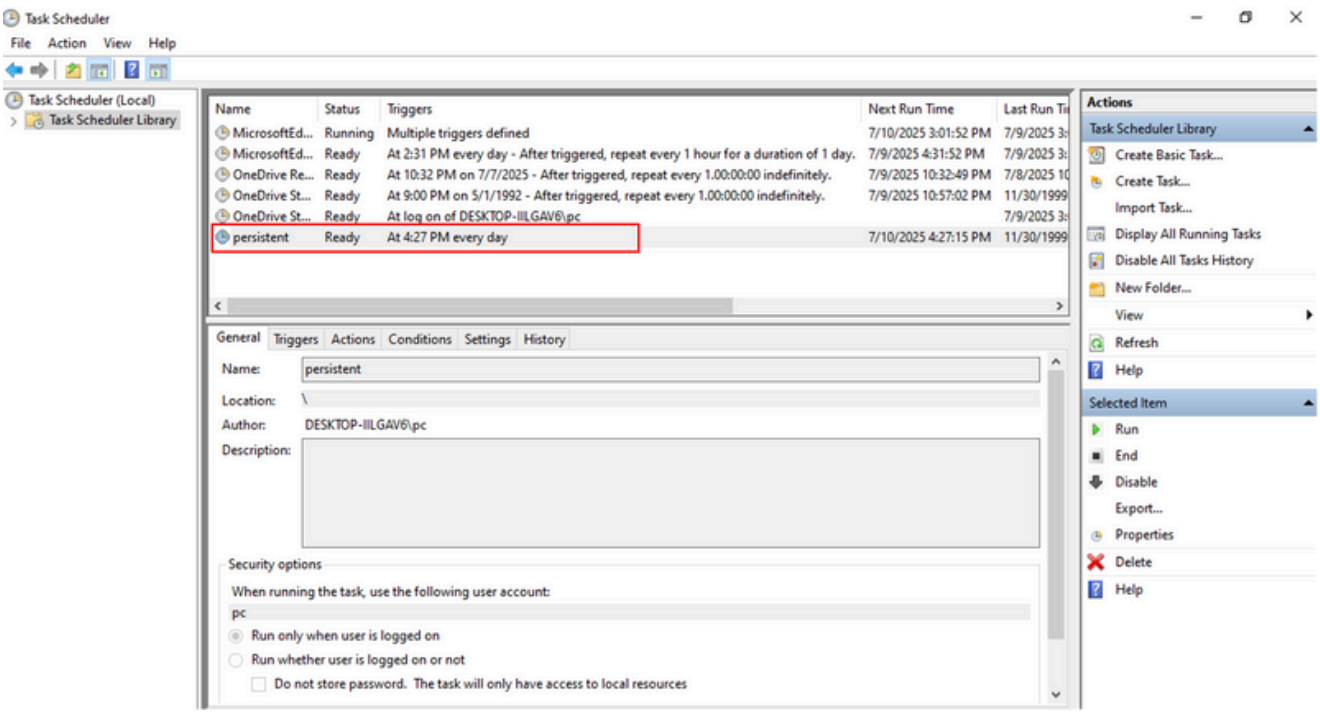


- **Program/script**: Type cmd.exe



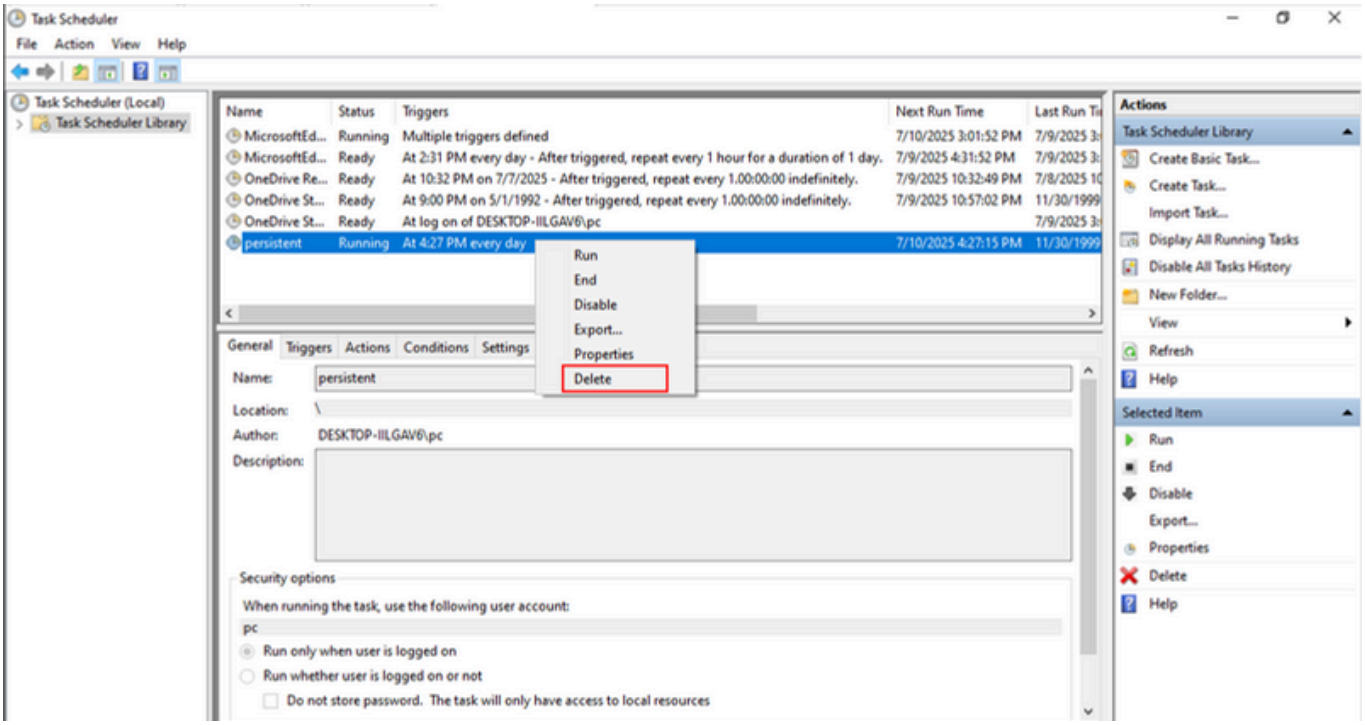
4. Click **Finish**.

5. You'll see the task listed as **Ready**.



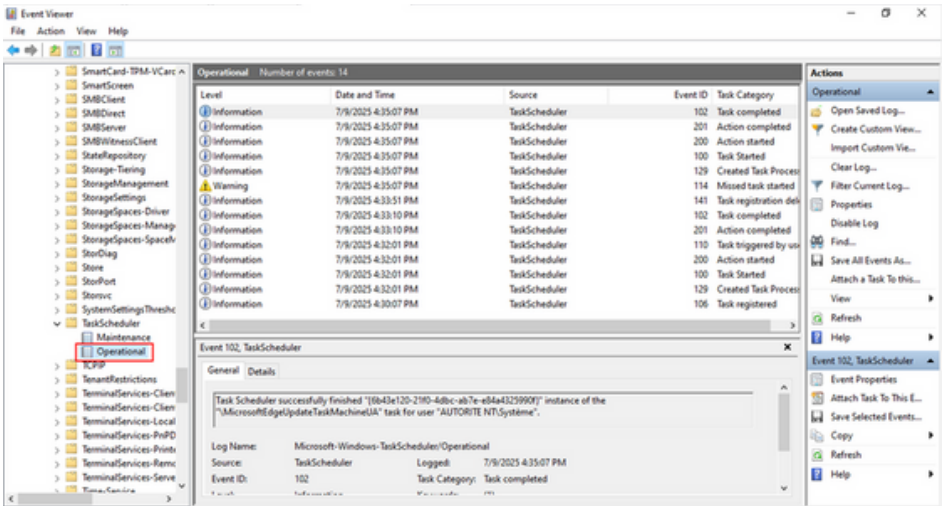
6. To test it, right-click the task and choose **Run,** a command prompt should open.

7. After testing, you can delete the task.

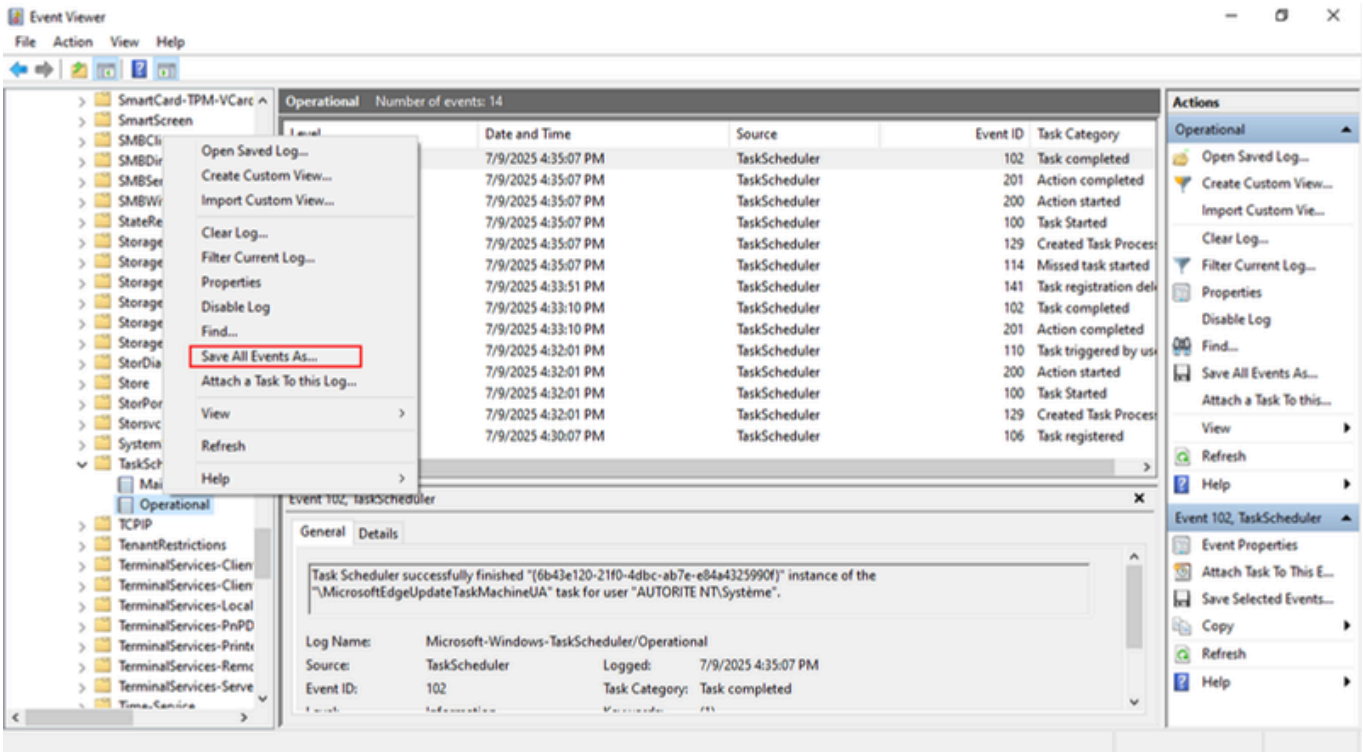


3. Save Task Scheduler Logs

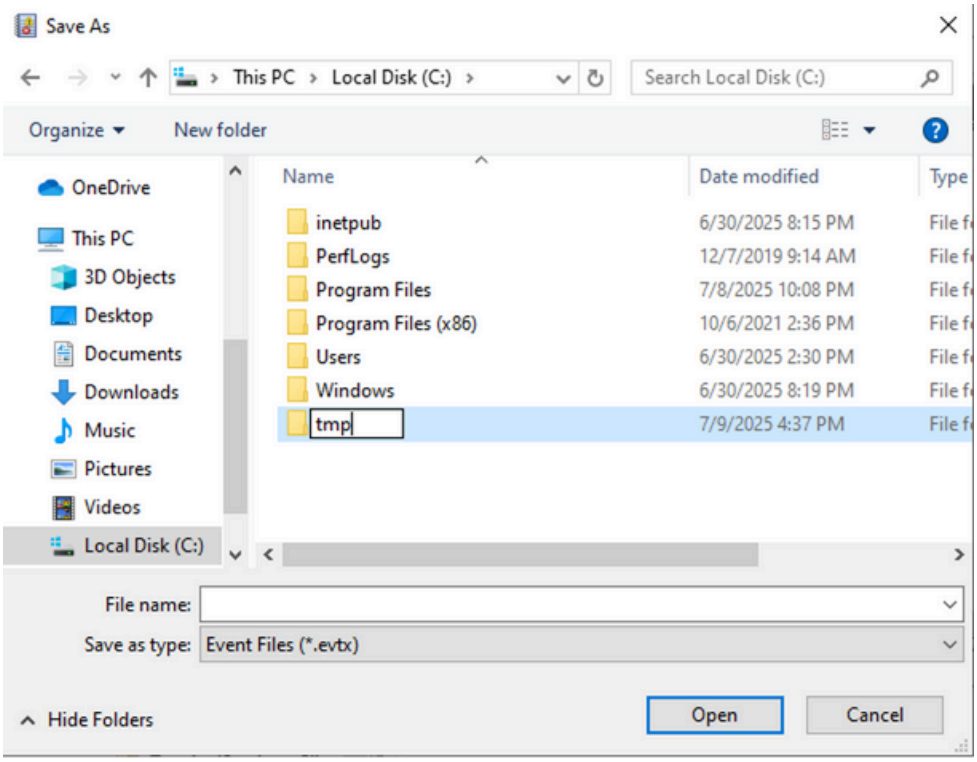
1. Go back to Event Viewer →
   - Applications and Services Logs > Microsoft > Windows > TaskScheduler > Operational



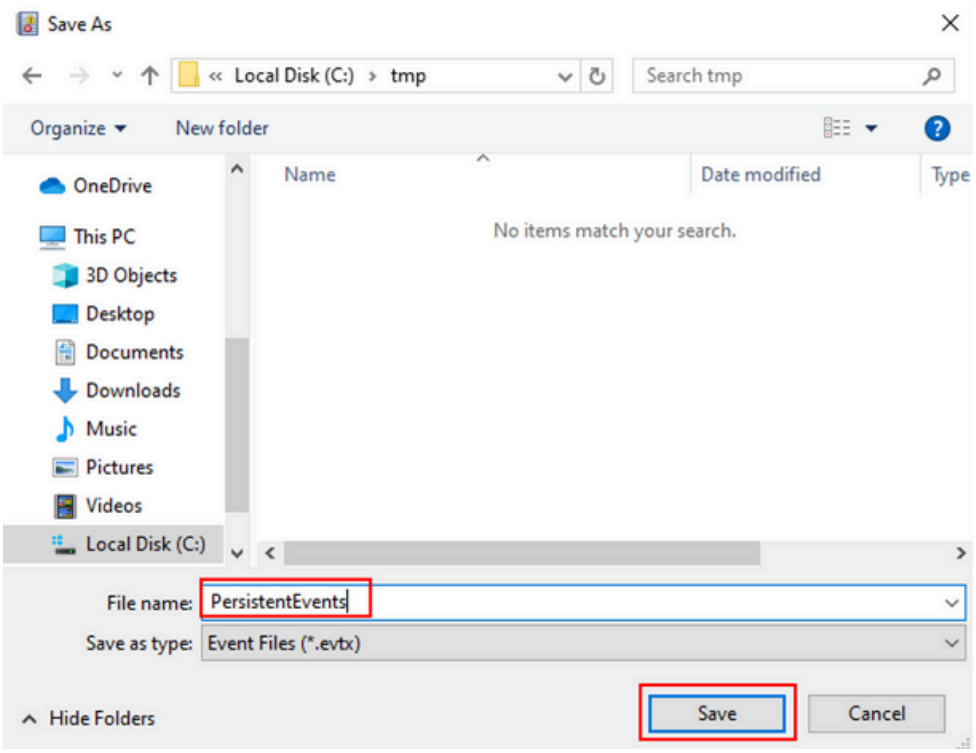
2. Right-click **Operational** → **Save All Events As...**



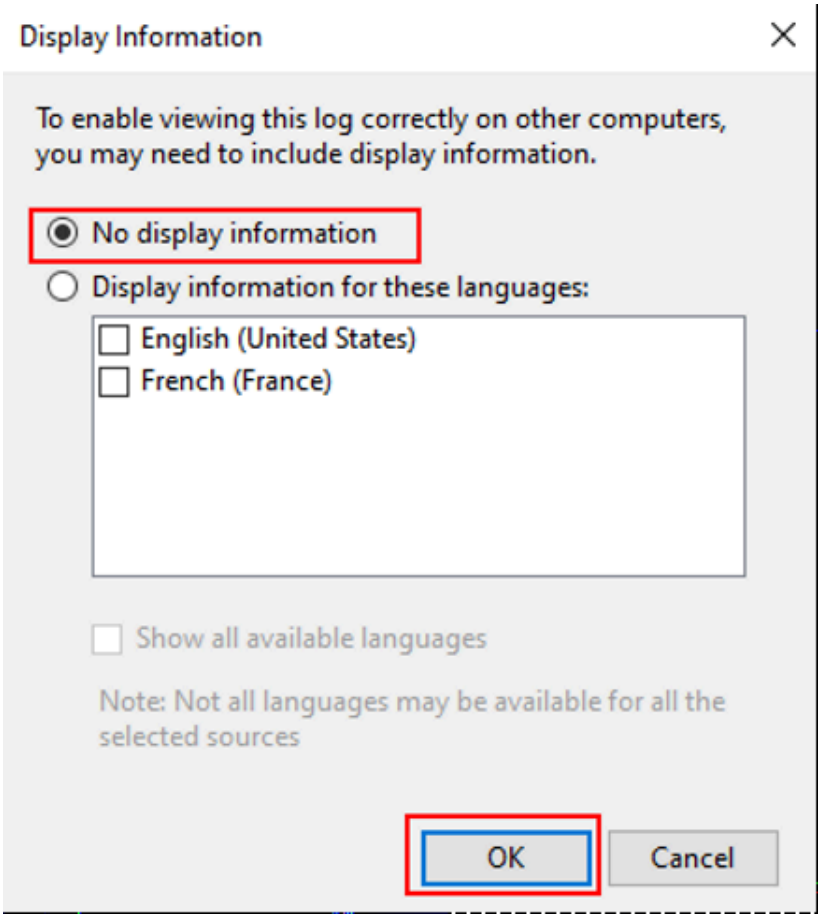
3. Choose a folder like C:\tmp



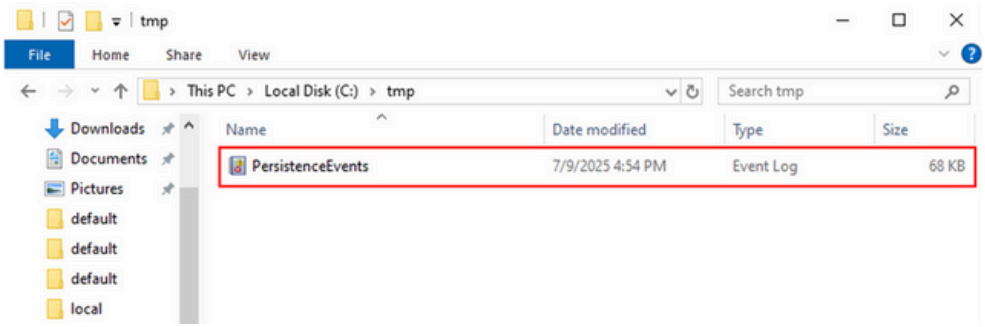
- Name the file: PersistentEvents.evtx
- Choose **Event Files (*.evtx)** as the file type
- Click **Save**



6. When asked about display info, choose **No display information**



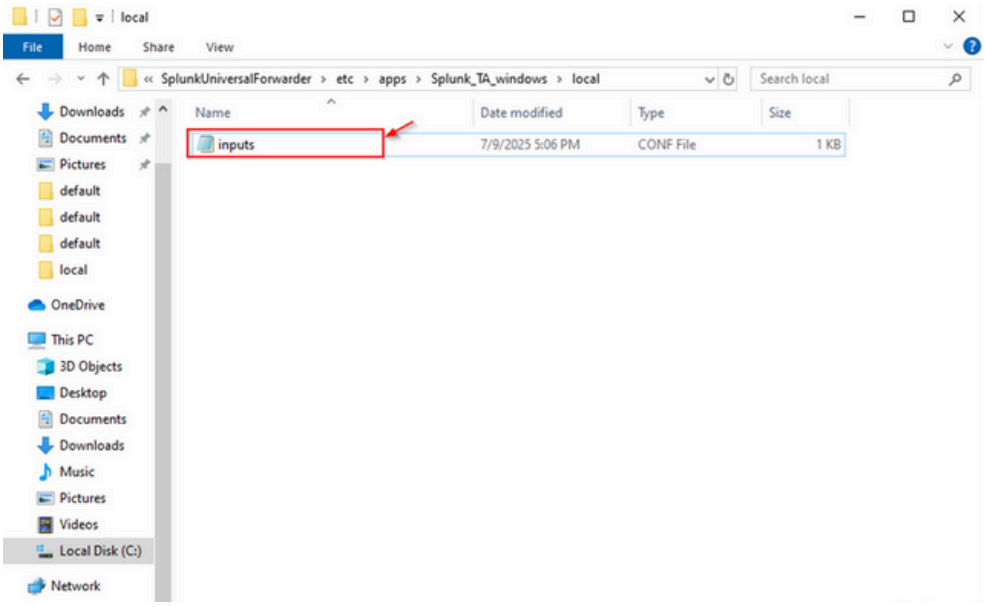
7. Confirm the file is saved in C:\tmp



4. Configure Splunk Universal Forwarder to Monitor the Folder

1. Open the file:

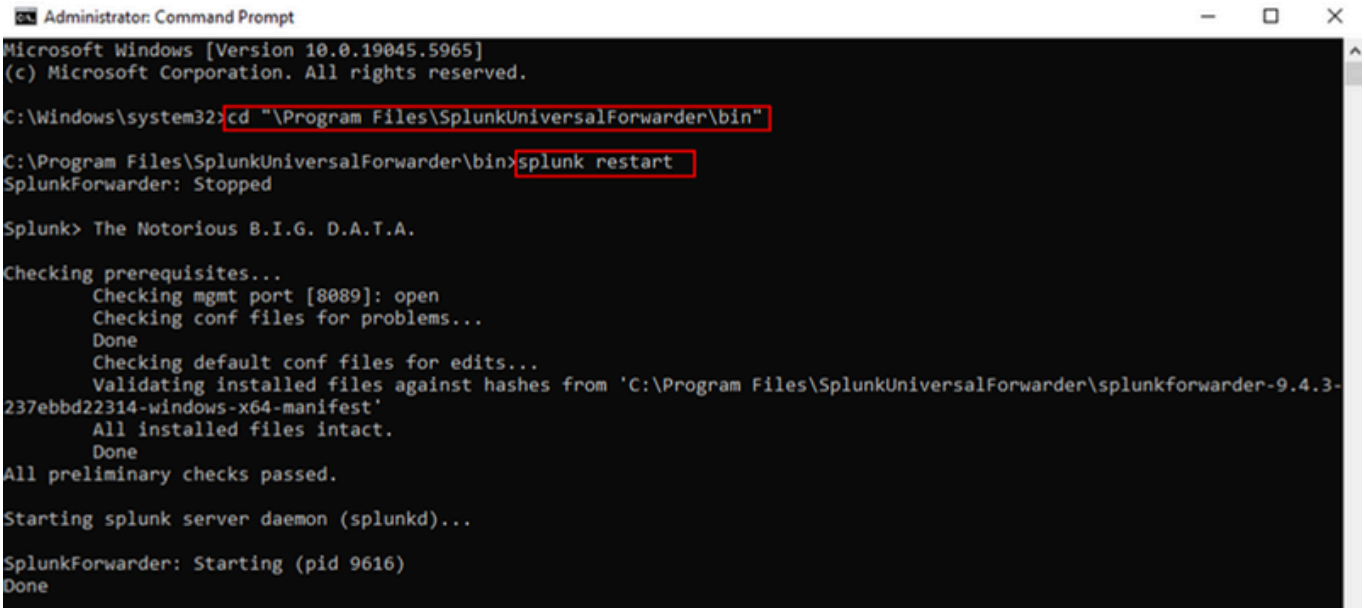
- C:\Program Files\SplunkUniversalForwarder\etc\apps\Splunk_TA_windows\local\inputs.conf



2. Add this configuration:

- disabled = 0 means monitoring is active
- index = test sends the data to the index named test

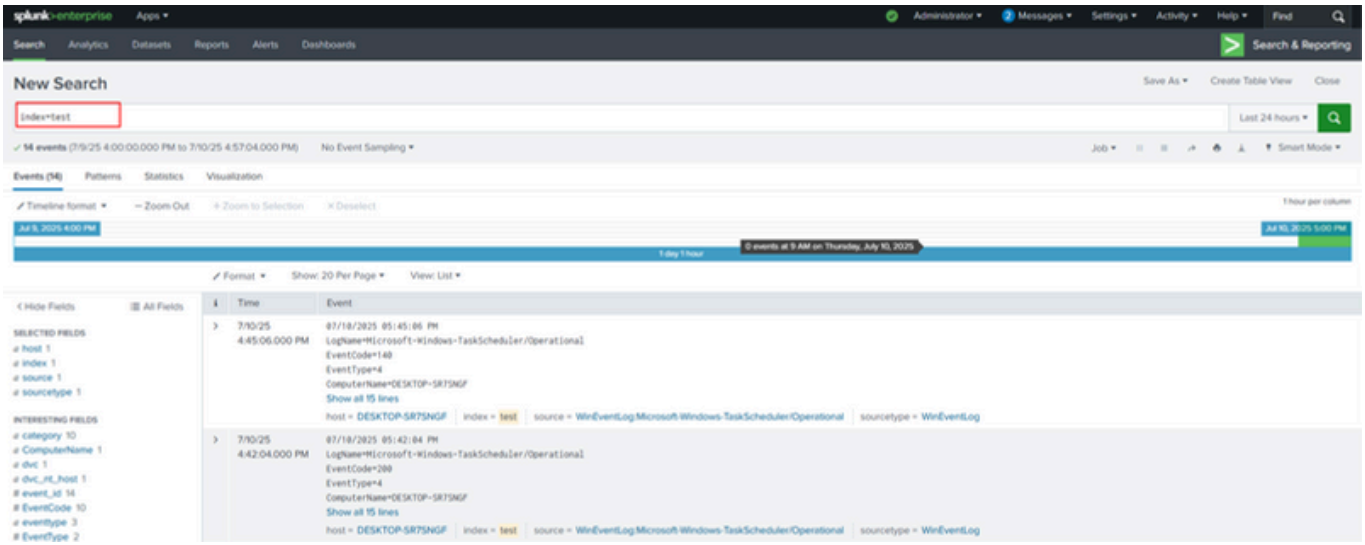
3. Restart the Universal Forwarder:
   - Open **Admin Command Prompt**
   - Go to: C:\Program Files\SplunkUniversalForwarder\bin
   - Run: splunk restart



5. Verify Logs in Splunk Web

To check if logs are coming in:

1. Open Splunk Web in your browser.
2. In the search bar, type: index=test
3. You should see events from the folder C:\tmp, like: WinEventLog:Microsoft-Windows-TaskScheduler/Operational



Onboarding Windows Registry Data

Monitoring the Windows Registry provides valuable insights for numerous use cases, aiding in security investigations and system health monitoring.

Why Monitor the Windows Registry?

The Windows Registry is like a big settings database for Windows and its apps. Monitoring it helps you:

- **Detect new services**: Can show if malware or unknown software was installed.
- **Track autoruns**: Malware often sets itself to start with Windows.
- **Spot disabled security features**: Like WDigest being turned off — a sign of attack.
- **Help investigations**: Shows info about installed software, COM objects, etc.
- **Find weak settings**: Bad registry configs can be risky.
- **Detect unknown devices**: Registry logs can show if someone plugged in unauthorized hardware.

Configure Splunk to Monitor Registry

To collect registry data, you need to edit the inputs.conf file on the Windows machine where Splunk Universal Forwarder is installed.

- **Configuration**

What Each Line Means:

- WinRegMon://services: Just a name for this config.
- hive: Which part of the registry to watch, here it's services.
- proc: Watch all processes making changes.
- type: What kind of changes to track:
  - set: Change a value
  - create: Make a new key/value
  - delete: Remove a key/value
  - rename: Rename a key
- baseline = 1: Helps detect changes from a clean state.
- baseline_interval = 86400: Re-check every 24 hours.
- index = test: Send the data to the test index in Splunk.

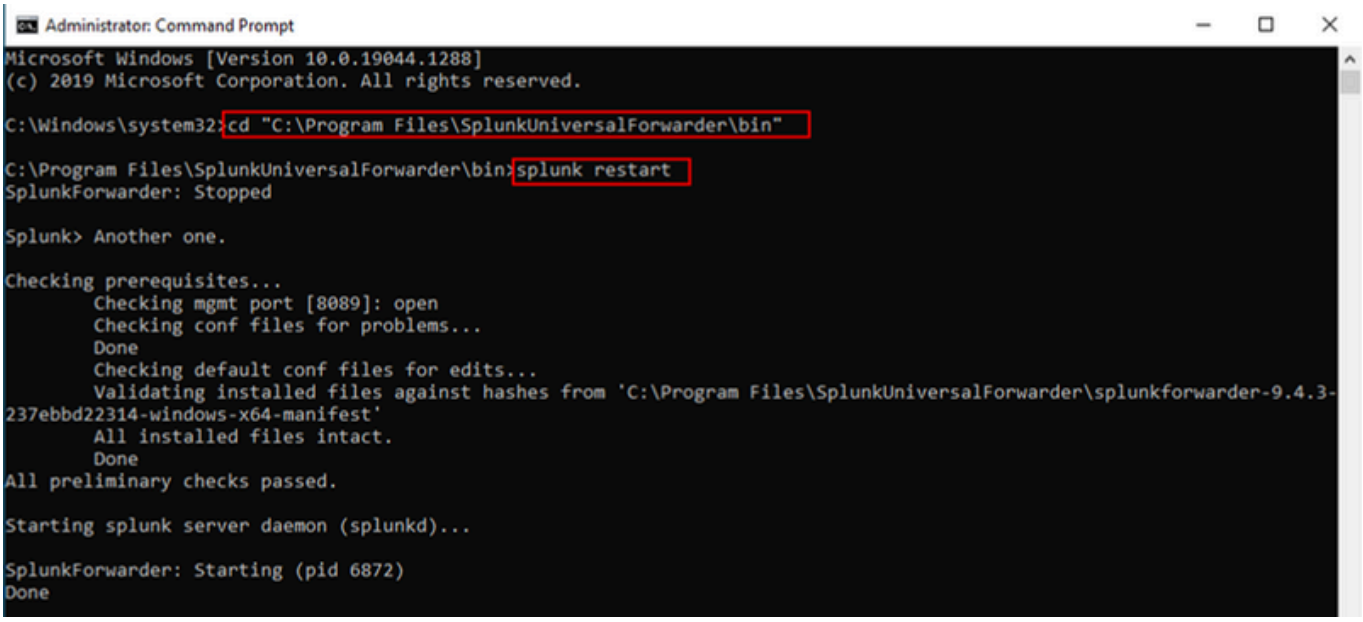
Where to Put This Config

- File path:

C:\Program Files\SplunkUniversalForwarder\etc\apps\Splunk_TA_windows\local\inputs.conf

Restart

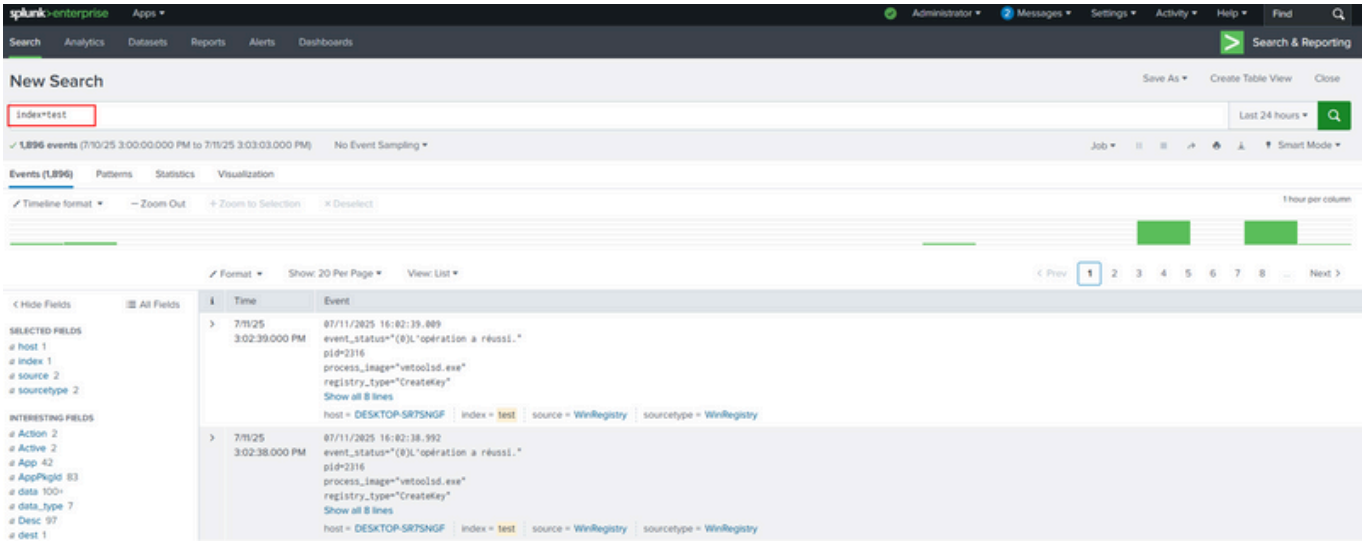
After editing, restart Splunk Universal Forwarder:



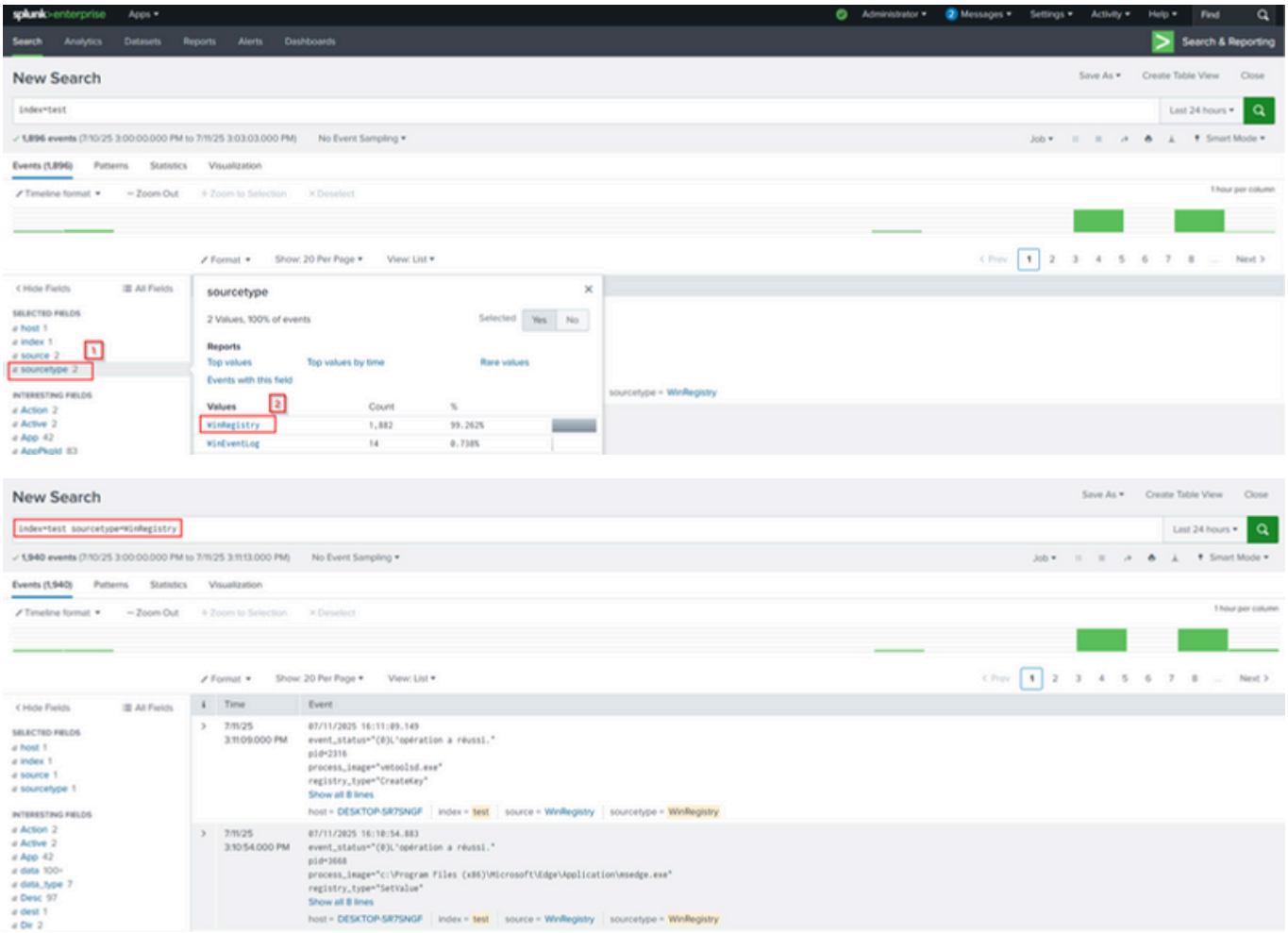
Search and Analyze Registry Data in Splunk

Once data is coming in, you can search it in Splunk Web.

Basic Search:



Filter for Registry Events:



If you don't see results, try changing the time range or check if sampling is enabled.

Time	Event			
	Type	Field	Value	Actions
	Selected	host	DESKTOP-SR7SNGF	
		index	test	
		source	WinRegistry	
		sourcetype	WinRegistry	
	Event	action	created	
		data		
		data_type	REG_NONE	
		dest	DESKTOP-SR7SNGF	
		event_status	(0)L'opération a réussi.	
		eventtype	windows_ta_data	
			winregistry_windows (change endpoint os registry windows)	
		key_path	HKLM\system\currentcontrolset\services\tcpip\parameters	
		msg	L'opération a réussi.	
		object	parameters	
		object_category	registry	
		object_path	HKLM\system\currentcontrolset\services\tcpip\parameters	
		pid	2316	
		process_id	2316	
		process_image	vmtoolsd.exe	
		registry_key_name	parameters	
		registry_path	HKLM\system\currentcontrolset\services\tcpip\parameters	
		registry_type	CreateKey	
		registry_value_type	REG_NONE	
		src	DESKTOP-SR7SNGF	
		status	success	
		tag	change	
			endpoint	
			os	
			registry	
			windows	
		user_type	process	
		vendor_action	CreateKey	
		vendor_product	Microsoft Windows	
		vendor_status	0	
	Time	_time	2025-07-11T15:11:09.000+00:00	
	Default	linecount	8	
		punct	//_::="()___:"==":"=""="\\\\\"="""="	
		splunk_server	splunk	

What You'll See in Results

Each registry event will show:

- time: When it happened
- event_status: Was it successful?
- process_image: Which program made the change
- registry_type: Type of change (e.g., createKey, SetValue)
- host: Which machine
- source: Where the data came from
- sourcetype: Should be WinRegistry
- action: What happened (e.g., modified)
- key_path: Full path to the registry key
- registry_key_name: Name of the key
- registry_path: Path to the key
- registry_value_name: Name of the value
- registry_value_type: Type of data (e.g., REG_BINARY)

Ingesting Dynamic Windows Registry Data

Splunk's powerful data ingestion features allow organizations to collect and analyze machine data for security, operations, and performance. Going beyond basic log collection, a strategic approach focuses on targeted data to reduce noise and improve insights.

Strategic Data Collection Using inputs.conf

The inputs.conf file on Splunk Universal Forwarders is where you define what data to collect. It gives you fine control to:

- Filter specific events
- Reduce resource usage
- Focus on relevant security signals

Example: Targeted Windows Security Event Log Ingestion

Instead of collecting all logs, you can focus on critical security events, like changes to security-enabled groups (e.g., local Administrators group).

Key Event IDs:

- 4732: A user was added to a security-enabled local group
- 4733: A user was removed from a security-enabled local group

Sample Configuration in inputs.conf:

- whitelist: Only collects events with ID 4732 or 4733
- index: Sends data to the security_monitoring index

- After modifying inputs.conf, a **restart** of the Splunk Universal Forwarder is mandatory for the changes to take effect:

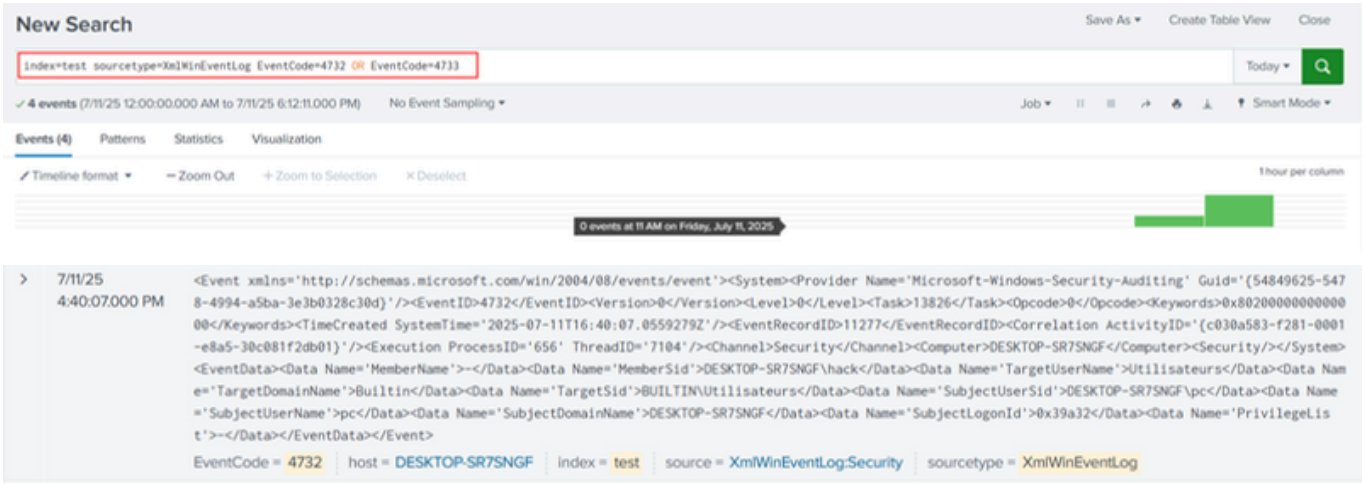
```
C:\Program Files\SplunkUniversalForwarder\bin>splunk restart
SplunkForwarder: Stopped

Splunk> Another one.

Checking prerequisites...
        Checking mgmt port [8089]: open
        Checking conf files for problems...
        Done
        Checking default conf files for edits...
        Validating installed files against hashes from 'C:\Program Files\SplunkUniversalForwarder\splunkforwarder-9.4.3-
237ebbd22314-windows-x64-manifest'
        All installed files intact.
        Done
All preliminary checks passed.

Starting splunk server daemon (splunkd)...

SplunkForwarder: Starting (pid 4812)
Done
```

This method is called source-side filtering, it reduces bandwidth and indexing costs by filtering logs before they reach Splunk.

Verifying Ingestion

To test if it works:

1. Add/remove a user from the local Administrators group
2. Search in Splunk:



Beyond EventCode: Using whitelist Flexibly

The whitelist (and its opposite, blacklist or denylist) can filter any field Splunk parses, not just EventCode.

This means you can:

- Target specific usernames
- Filter by process name
- Focus on registry paths, etc.

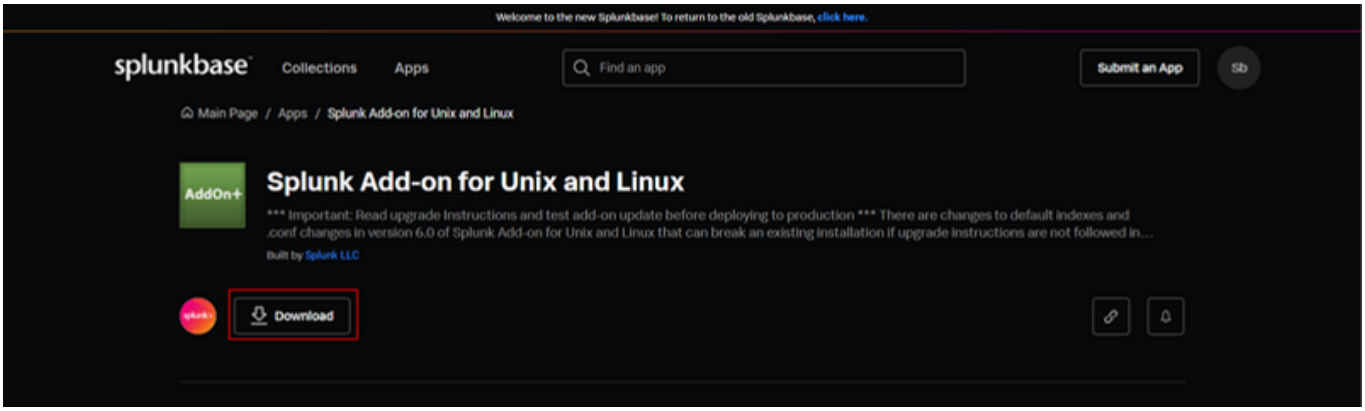
For advanced use, check Splunk's official documentation on allow/deny list formats.

Onboarding Generic Linux System Logs

To collect Linux logs (like /var/log/auth.log) and send them to Splunk, you need the Splunk Add-on for Unix and Linux installed on your Universal Forwarder (UF).

Step 1: Download the Add-on

- Go to Splunkbase and download **Splunk Add-on for Unix and Linux** (.tgz file).



Step 2: Transfer to the Universal Forwarder

- Use SCP to copy the .tgz file to your UF:

```
PS C:\WINDOWS\system32> scp C:\Users\pc\Downloads\splunk-add-on-for-unix-and-linux_1010.tgz ubuntu@192.168.1.15:/home/ubuntu/
ubuntu@192.168.1.15's password:
splunk-add-on-for-unix-and-linux_1010.tgz                     100%  132KB  21.4MB/s   00:00
```

- Verify with:

```
ubuntu@ubuntu:~$ ls -l
total 87100
-rw-rw-r--  1 ubuntu ubuntu   134865 Jul 12 16:26 splunk-add-on-for-unix-and-linux_1010.tgz
drwxr-x--- 11 ubuntu ubuntu     4096 Jul 12 13:43 splunkforwarder
-rw-rw-r--  1 ubuntu ubuntu 89045711 Jun  4 18:47 splunkforwarder-9.4.3-237ebbd22314-linux-amd64.tgz
```

You should see the .tgz file.

Step 3: Install the Add-on

- Move the file to the apps directory:

```
ubuntu@ubuntu:~$ mv splunk-add-on-for-unix-and-linux_1010.tgz /home/ubuntu/splunkforwarder/etc/apps/
```

- Navigate to the directory and extract:

```
ubuntu@ubuntu:~$ cd ./splunkforwarder/etc/apps/
ubuntu@ubuntu:~/splunkforwarder/etc/apps$ ls
audit_trail                 learned                                splunk_httpinput
introspection_generator_addon  search                              splunk_internal_metrics
journald_input              splunk-add-on-for-unix-and-linux_1010.tgz  SplunkUniversalForwarder
```

```
ubuntu@ubuntu:~/splunkforwarder/etc/apps$ tar -xf splunk-add-on-for-unix-and-linux_1010.tgz
ubuntu@ubuntu:~/splunkforwarder/etc/apps$ ls
audit_trail                  search                                  Splunk_TA_nix
introspection_generator_addon splunk-add-on-for-unix-and-linux_1010.tgz SplunkUniversalForwarder
journald_input               splunk_httpinput
learned                      splunk_internal_metrics
```

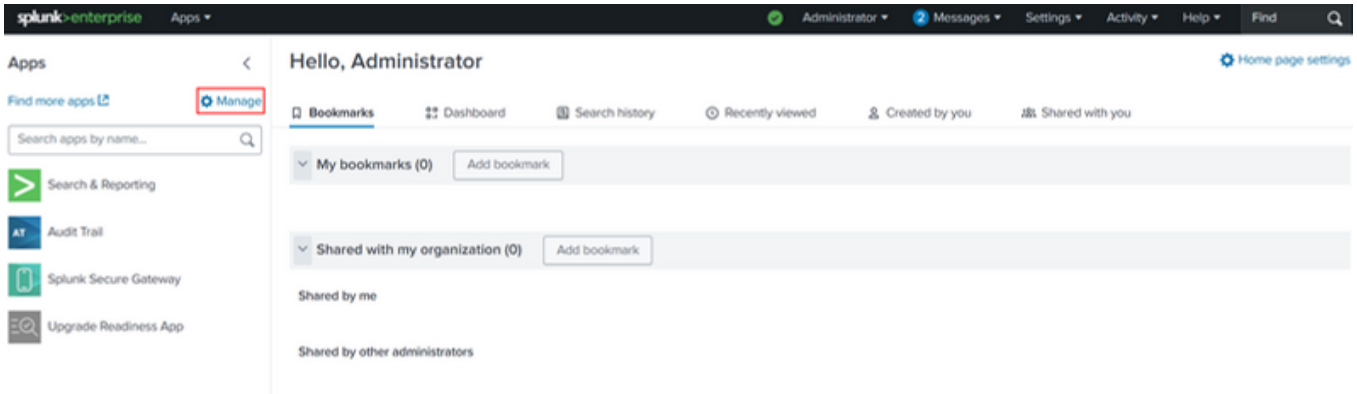
You should see Splunk_TA_nix.

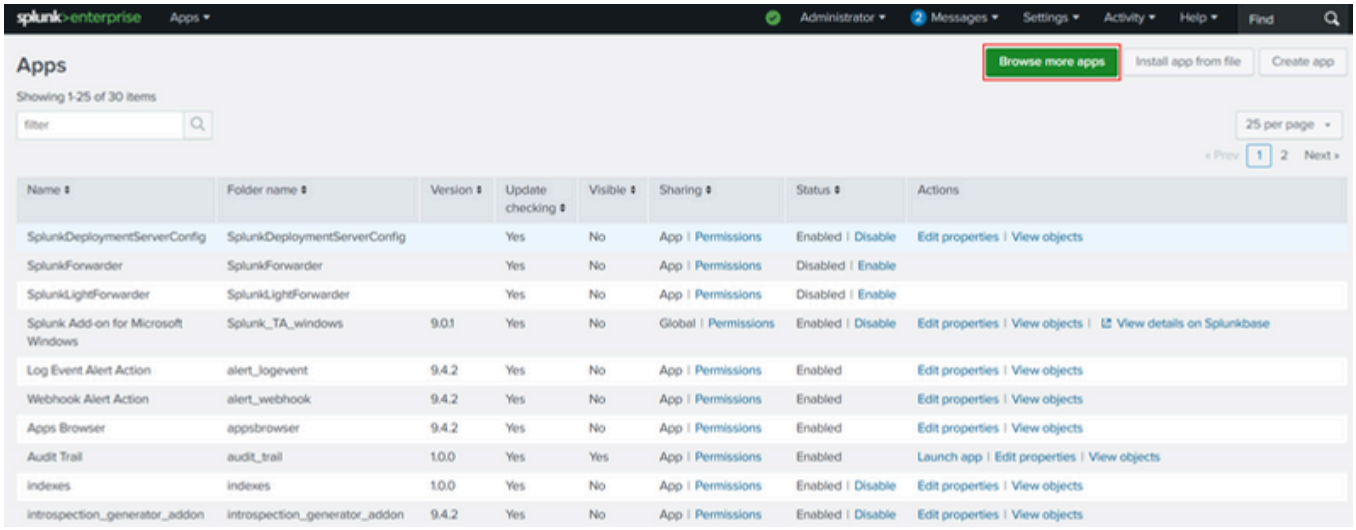
- **Restart UF:**

```
ubuntu@ubuntu:~/splunkforwarder/bin$ sudo ./splunk restart
[sudo] password for ubuntu:
Warning: Attempting to revert the SPLUNK_HOME ownership
Warning: Executing "chown -R ubuntu:ubuntu /home/ubuntu/splunkforwarder"
splunkd is not running.
splunkd.pid doesn't exist...

Splunk> The IT Search Engine.

Checking prerequisites...
        Checking mgmt port [8089]: open
        Checking conf files for problems...
        Done
        Checking default conf files for edits...
        Validating installed files against hashes from '/home/ubuntu/splunkforwarder/splunkforwarder
-9.4.3-237ebbd22314-linux-amd64-manifest'
        All installed files intact.
        Done
All preliminary checks passed.

Starting splunk server daemon (splunkd)...
Done
```

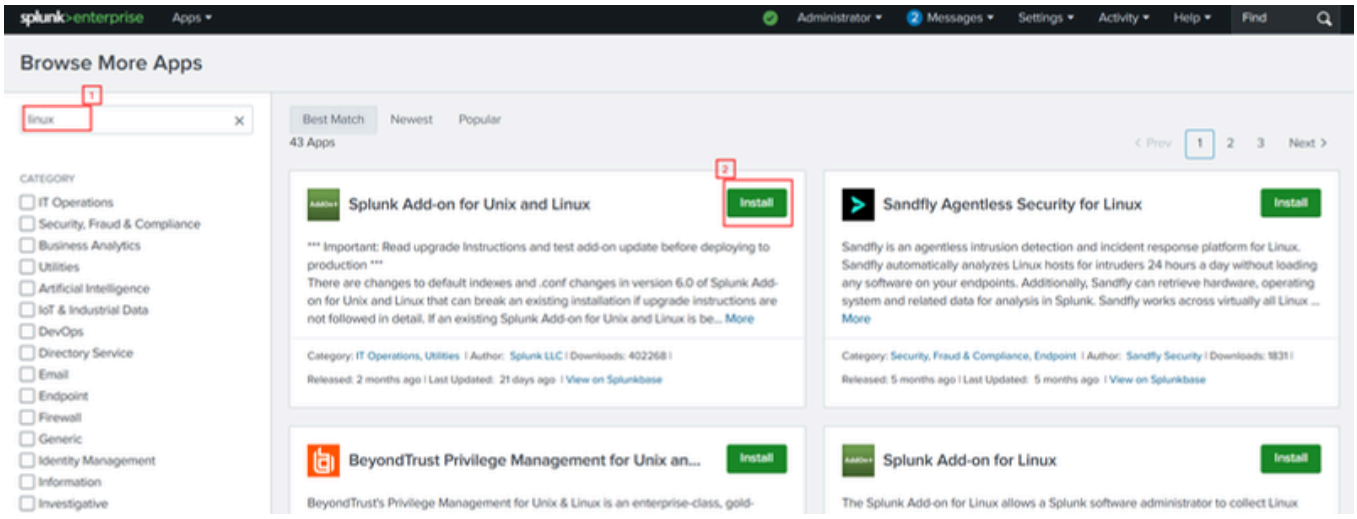
4. Alternative Method (Splunk Web)

- Go to **Apps (Manage)** → **Browse More Apps** in Splunk Enterprise.





- Search for **Splunk Add-on for Unix and Linux** and click Install.



Step 4: Configure Data Input

- Create a local directory inside Splunk_TA_nix if it doesn't exist.

```
ubuntu@ubuntu:~/splunkforwarder$ cd ./etc/apps/
ubuntu@ubuntu:~/splunkforwarder/etc/apps$ ls
audit_trail                   search                                  Splunk_TA_nix
introspection_generator_addon splunk-add-on-for-unix-and-linux_1010.tgz SplunkUniversalForwarder
journald_input                splunk_httpinput
learned                       splunk_internal_metrics
ubuntu@ubuntu:~/splunkforwarder/etc/apps$ cd Splunk_TA_nix/
ubuntu@ubuntu:~/splunkforwarder/etc/apps/Splunk_TA_nix$ mkdir local^C
```

- Create inputs.conf:

```
ubuntu@ubuntu:~/splunkforwarder/etc/apps/Splunk_TA_nix$ cd local/
ubuntu@ubuntu:~/splunkforwarder/etc/apps/Splunk_TA_nix/local$ nano inputs.conf
```

```
 GNU nano 6.2                                  inputs.conf *
[monitor:///var/log/auth.log]
sourcetype = linux_secure
index = test
```

- Save and exit.
- **Restart UF:**

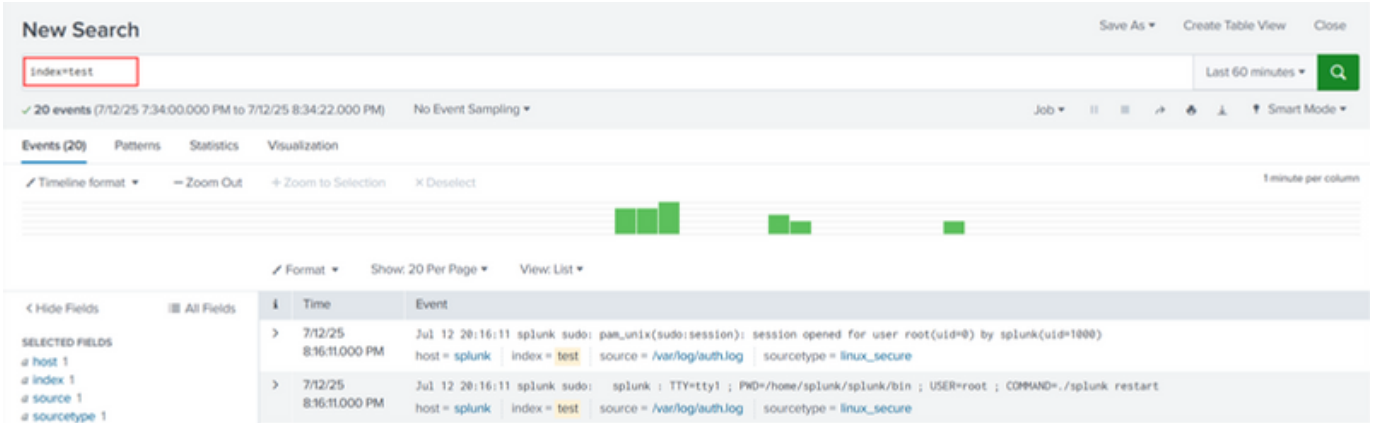
```
ubuntu@ubuntu:~/splunkforwarder/bin$ sudo ./splunk restart
[sudo] password for ubuntu:
Warning: Attempting to revert the SPLUNK_HOME ownership
Warning: Executing "chown -R ubuntu:ubuntu /home/ubuntu/splunkforwarder"
Stopping splunkd...
Shutting down.  Please wait, as this may take a few minutes.

Stopping splunk helpers...

Done.
splunkd.pid doesn't exist...

Splunk> The IT Search Engine.
```

6. Verifying Data Ingestion in Splunk Enterprise

After restarting the Splunk Universal Forwarder, you can confirm that authentication logs from your Linux system are being successfully sent to Splunk.

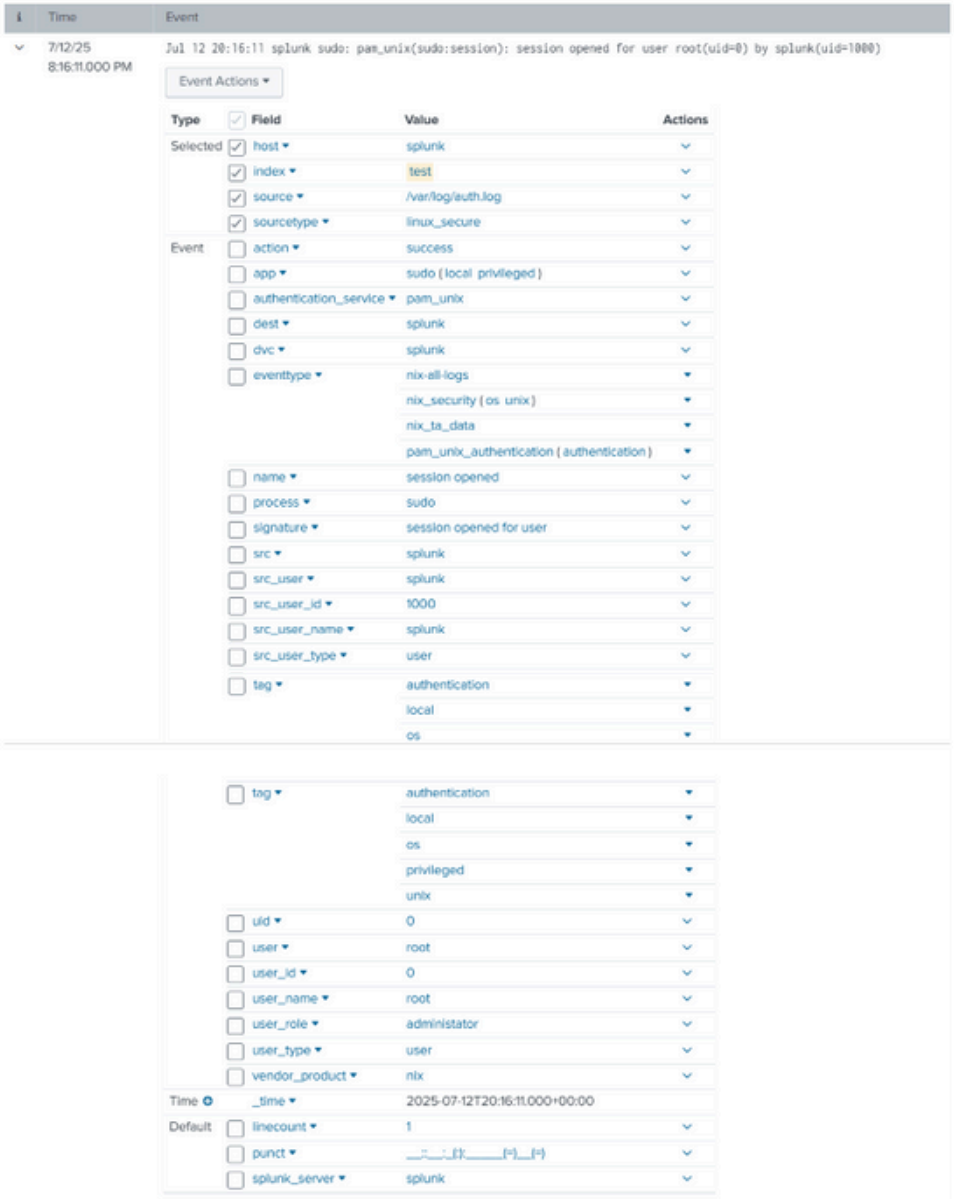
Step-by-Step Verification

1. Perform a Search
- Go to the Search & Reporting app
- In the search bar, enter:



2. Review Search Results

You should see events coming from /var/log/auth.log. These events confirm that your Universal Forwarder is working correctly.



Example Event Fields

Here are some of the fields you'll see in the search results:

- host: The name of your Linux server
- index: test (as configured)
- source: /var/log/auth.log
- sourcetype: linux_secure
- action: e.g., success for successful logins
- user: The username involved in the login
- _time: When the event happened

Onboarding Authentication Logs from Ubuntu UF

You can collect logs from /var/log/auth.log using two methods:

1. Using the full Splunk TA-linux_secure add-on
2. Using only inputs.conf for a lightweight setup

Prerequisites

- Splunk Universal Forwarder installed on Ubuntu
- SSH or console access to the server
- A running Splunk indexer
- A working outputs.conf file

1. Set Up outputs.conf

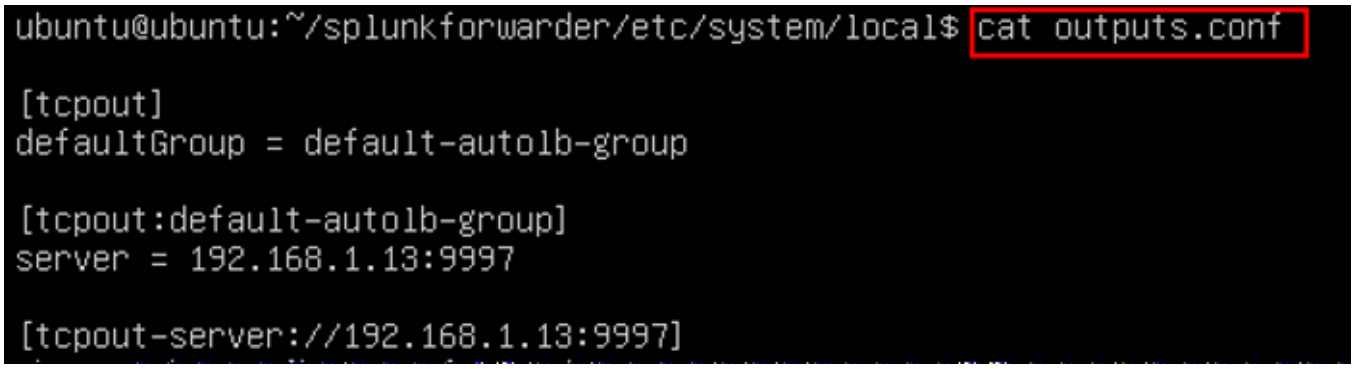
This file tells the Universal Forwarder where to send data.

Steps:

- Copy your existing outputs.conf to:

/home/ubuntu/splunkforwarder/etc/system/local/

- Use scp from your local machine:



- Make sure the IP and port in outputs.conf match your Splunk indexer (default port is 9997)

2. Ensure Splunk User Can Read Log Files

The Splunk Forwarder runs under a specific user (often splunk). This user needs read access to /var/log/auth.log.

Add Read Permission

```
ubuntu@ubuntu:~$ sudo chmod o+r /var/log/auth.log
[sudo] password for ubuntu:
```

- This is less secure if the file contains sensitive data.

Check

```
ubuntu@ubuntu:~$ ls -l /var/log/auth.log
-rw-r--r-- 1 syslog adm 3594 Jul 13 15:49 /var/log/auth.log
```

- This is safer and more standard for log access.

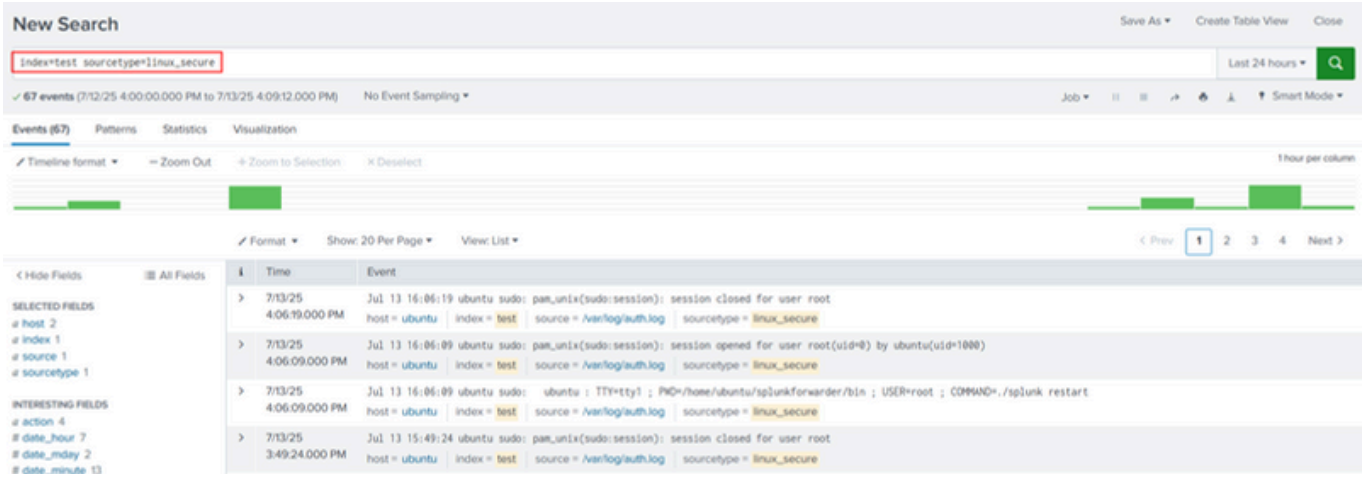
3. Restarting the Universal Forwarder

After making changes (permissions, config files), restart the service:

```
ubuntu@ubuntu:~$ cd /home/ubuntu/splunkforwarder/bin
ubuntu@ubuntu:~/splunkforwarder/bin$ sudo ./splunk restart
[sudo] password for ubuntu:
Warning: Attempting to revert the SPLUNK_HOME ownership
Warning: Executing "chown -R ubuntu:ubuntu /home/ubuntu/splunkforwarder"
Stopping splunkd...
Shutting down.  Please wait, as this may take a few minutes.

Stopping splunk helpers...

Done.
splunkd.pid doesn't exist...

Splunk> Be an IT superhero. Go home early.
```

4. Final Verification in Splunk

- Go to Splunk Web
- Search:



- You should see parsed events from /var/log/auth.log, confirming successful onboarding!

Configuring Ingestion for Apache Web Server Access Logs

If you're running an Apache web server and want to send access logs to Splunk in a clean, structured way, here's a simple guide to help you do that using JSON format and the Splunk Universal Forwarder.

1. Configure Apache to Log in JSON Format

Splunk works best with structured data like JSON. So first, we'll set up Apache to log access data in JSON.

1.1 Define Custom Log Format

- Go to Apache config folder:

```
ubuntu@apache:~$ cd /etc/apache2/
ubuntu@apache:/etc/apache2$ ls -al
total 88
drwxr-xr-x  8 root root  4096 Jul 13 20:45 .
drwxr-xr-x 97 root root  4096 Jul 13 20:46 ..
-rw-r--r--  1 root root  7224 Apr  3 09:05 apache2.conf
drwxr-xr-x  2 root root  4096 Jul 13 20:45 conf-available
drwxr-xr-x  2 root root  4096 Jul 13 20:45 conf-enabled
-rw-r--r--  1 root root  1782 Mar 18  2024 envvars
-rw-r--r--  1 root root 31063 Mar 18  2024 magic
drwxr-xr-x  2 root root 12288 Jul 13 20:45 mods-available
drwxr-xr-x  2 root root  4096 Jul 13 20:45 mods-enabled
-rw-r--r--  1 root root   320 Mar 18  2024 ports.conf
drwxr-xr-x  2 root root  4096 Jul 13 20:45 sites-available
drwxr-xr-x  2 root root  4096 Jul 13 20:45 sites-enabled
```

- Create a new config file (e.g. log-splunk.conf) inside conf-available:

```
ubuntu@apache:/etc/apache2$ sudo nano conf-available/log-splunk.conf
```

- Add this custom log format:

```
  GNU nano 6.2                        conf-available/log-splunk.conf *
<IfModule log_config_module>
    #
    # The following directives define some format nicknames for use with
    # a CustomLog directive (see below).
    #
    LogFormat "%h %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-Agent}i\"" combined
    LogFormat "%h %l %u %t \"%r\" %>s %b" common

 <IfModule logio_module>
    # You need to enable mod_logio.c to use %I and %O
<client=%h, status=%>s, uri_path=\"%U\", uri_query=\"%q\", user=\"%u\"" splunk_json

    #LogFormat "{\"time\":\"%{%s}t.%{usec_frac}t\", \"bytes_in\":\"%I\", \"bytes_out\":\"%O\", \"cookie>

  #LogFormat "%h %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-Agent}i\" %I %O" combinedio

</IfModule>
    #
    # The location and format of the access logfile (Common Logfile Format).
    # If you do not define any access logfiles within a <VirtualHost>
    # container, they will be logged here.  Contrariwise, if you *do*
    # define per-<VirtualHost> access logfiles, transactions will be
    # logged therein and *not* in this file.
    #
    # CustomLog "logs/access_log" common
    #
    # If you prefer a logfile with access, agent, and referer information
    # (Combined Logfile Format) you can use the following directive.
    #
    CustomLog "/var/log/apache2/access.log" splunk_json
    #CustomLog "logs/access_log" splunk_json
    #CustomLog "logs/access_log" combined
</IfModule>
```

- Save and exit (Ctrl+X, then Y, then Enter).

1.2 Apply the JSON Format to Your Virtual Host

- Edit your default virtual host file:

```
ubuntu@apache:/etc/apache2$ sudo nano sites-available/000-default.conf
```

- Inside <VirtualHost *:80>, find or add this line:

```
 GNU nano 6.2                        sites-available/000-default.conf *
<VirtualHost *:80>
        # The ServerName directive sets the request scheme, hostname and port that
        # the server uses to identify itself. This is used when creating
        # redirection URLs. In the context of virtual hosts, the ServerName
        # specifies what hostname must appear in the request's Host: header to
        # match this virtual host. For the default virtual host (this file) this
        # value is not decisive as it is used as a last resort host regardless.
        # However, you must set it for any further virtual host explicitly.
        #ServerName www.example.com

        ServerAdmin webmaster@localhost
        DocumentRoot /var/www/html

        # Available loglevels: trace8, ..., trace1, debug, info, notice, warn,
        # error, crit, alert, emerg.
        # It is also possible to configure the loglevel for particular
        # modules, e.g.
        #LogLevel info ssl:warn

        ErrorLog ${APACHE_LOG_DIR}/error.log
        CustomLog ${APACHE_LOG_DIR}/access.log splunk_json

        # For most configuration files from conf-available/, which are
        # enabled or disabled at a global level, it is possible to
        # include a line for only one particular virtual host. For example the
        # following line enables the CGI configuration for this host only
        # after it has been globally disabled with "a2disconf".
        #Include conf-available/serve-cgi-bin.conf
</VirtualHost>

# vim: syntax=apache ts=4 sw=4 sts=4 sr noet
```

- Save and exit.
- Enable the config:

```
ubuntu@apache:/etc/apache2$ sudo a2enconf log-splunk
Enabling conf log-splunk.
To activate the new configuration, you need to run:
  systemctl reload apache2
```

- Apply Apache Changes

```
ubuntu@apache:/etc/apache2/conf-enabled$ sudo systemctl reload apache2
```

1.3 Verify Apache is Logging in JSON

- Generate some traffic (e.g., open your website).

```
ubuntu@apache:/etc/apache2/conf-enabled$ curl http://127.0.0.1
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-tran
sitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
  <!--
    Modified from the Debian original for Ubuntu
    Last updated: 2022-03-22
    See: https://launchpad.net/bugs/1966004
  -->
  <head>
    <meta http-equiv="Content-Type" content="text/html; charset=UTF-8" />
    <title>Apache2 Ubuntu Default Page: It works</title>
    <style type="text/css" media="screen">
  * {
    margin: 0px 0px 0px 0px;
    padding: 0px 0px 0px 0px;
  }

  body, html {
    padding: 3px 3px 3px 3px;

    background-color: #D8DBE2;

    font-family: Ubuntu, Verdana, sans-serif;
    font-size: 11pt;
    text-align: center;
  }

  div.main_page {
    position: relative;
    display: table;
```

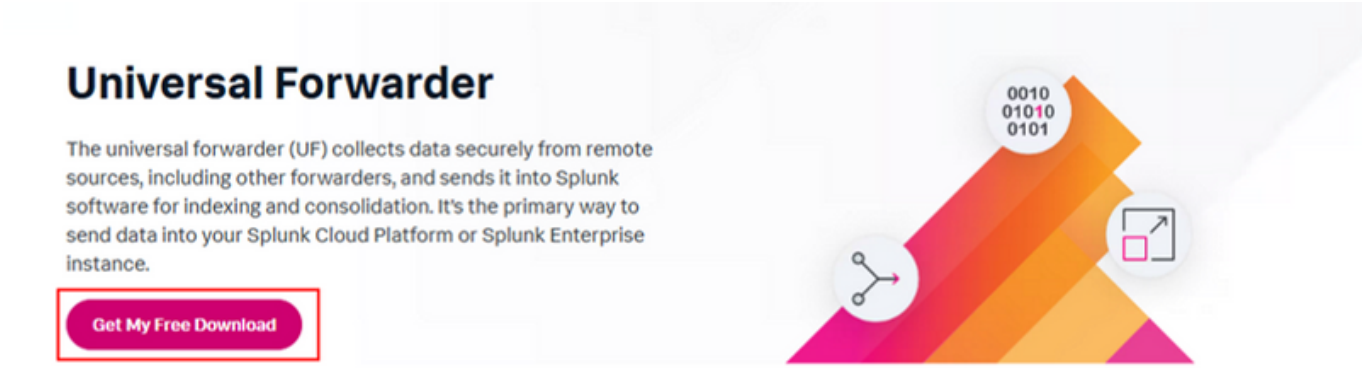
- Check the log:

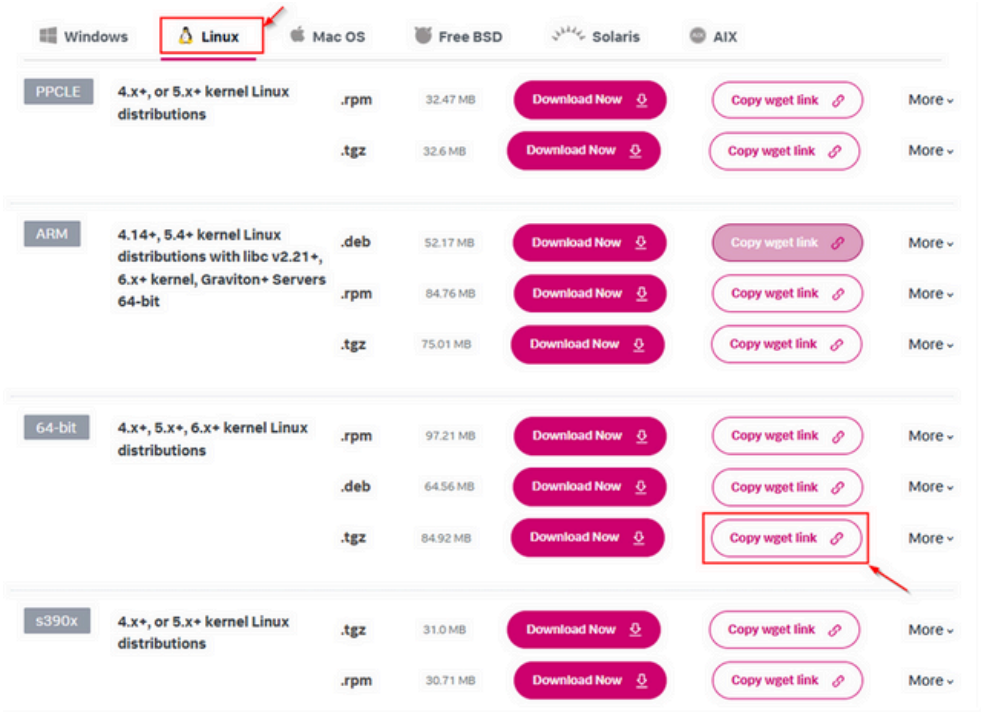
```
ubuntu@apache:/var/log/apache2$ tail access.log
time=1752507052.017982, bytes_in=73, bytes_out=10926, cookie="-", server=127.0.1.1, dest_port=80, http_cont
ent_type="-", http_method="GET", http_referrer="-", http_user_agent="curl/7.81.0", ident="-", response_time
_microseconds=2580, client=127.0.0.1, status=200, uri_path="/index.html", uri_query="", user="-"
```

You should see JSON-formatted entries.

2. Install Splunk Universal Forwarderr

- Go to Splunk Downloads and get the .tgz for Linux.





- Use wget to download it on your server.

```
ubuntu@apache:~$ wget -O splunkforwarder-9.4.3-237ebbd22314-linux-amd64.tgz "https://download
.splunk.com/products/universalforwarder/releases/9.4.3/linux/splunkforwarder-9.4.3-237ebbd223
14-linux-amd64.tgz"
--2025-07-14 16:01:23--  https://download.splunk.com/products/universalforwarder/releases/9.4.3/linux/splunk
forwarder-9.4.3-237ebbd22314-linux-amd64.tgz
Resolving download.splunk.com (download.splunk.com)... 52.84.66.28, 52.84.66.112, 52.84.66.10, ...
Connecting to download.splunk.com (download.splunk.com)|52.84.66.28|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 89045711 (85M) [binary/octet-stream]
Saving to: 'splunkforwarder-9.4.3-237ebbd22314-linux-amd64.tgz'

splunkforwarder-9.4.3-2 100%[=========================>]  84.92M  1.95MB/s    in 43s

2025-07-14 16:02:11 (1.98 MB/s) - 'splunkforwarder-9.4.3-237ebbd22314-linux-amd64.tgz' saved [89045711/89045
711]
```

- Extract it:

```
ubuntu@apache:~$ tar -xzvf ./splunkforwarder-9.4.3-237ebbd22314-linux-amd64.tgz
splunkforwarder/
splunkforwarder/swidtag/
splunkforwarder/swidtag/splunk-UniversalForwarder-primary.swidtag
splunkforwarder/opt/
splunkforwarder/opt/jemalloc-4k-stats/
splunkforwarder/opt/jemalloc-4k-stats/include/
splunkforwarder/opt/jemalloc-4k-stats/include/jemalloc/
splunkforwarder/opt/jemalloc-4k-stats/include/jemalloc/jemalloc.h
splunkforwarder/opt/jemalloc-4k-stats/lib/
```

- Enable the forwarder:

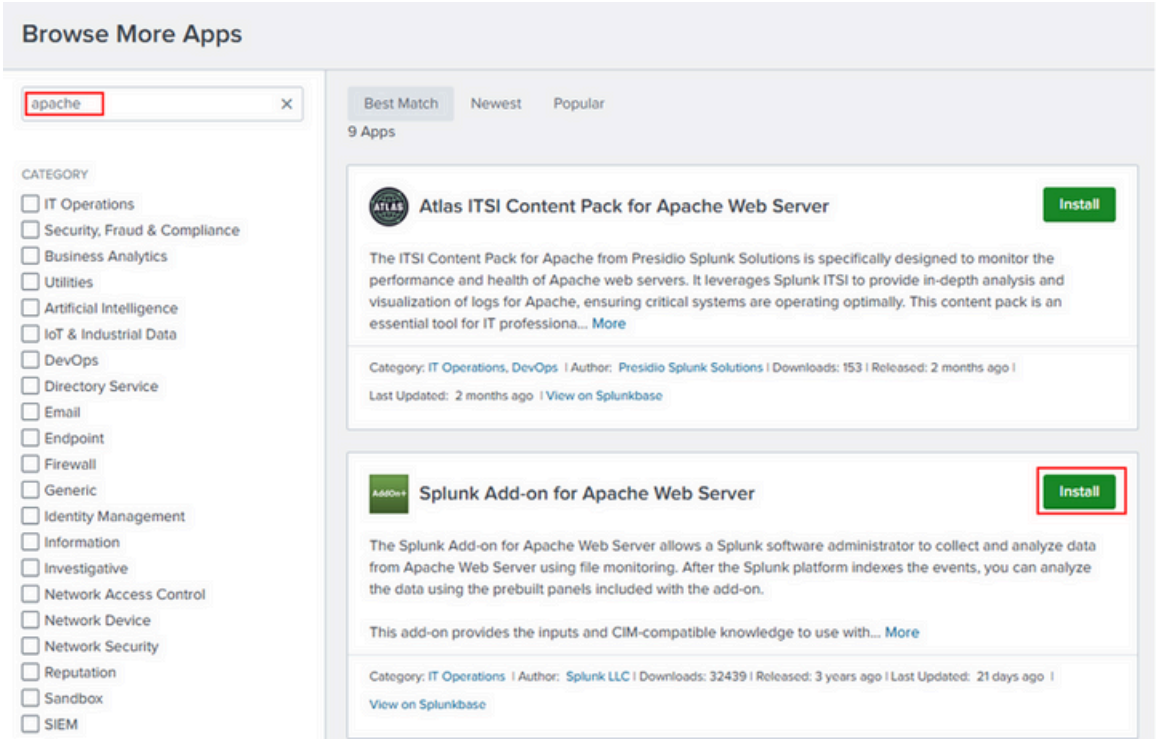
```
ubuntu@apache:~$ sudo /home/ubuntu/splunkforwarder/bin/splunk enable boot-start -user ubuntu -systemd-managed 1
```

- Start the forwarder:

```
ubuntu@apache:~$ ./splunkforwarder/bin/splunk start
Warning: Attempting to revert the SPLUNK_HOME ownership
Warning: Executing "chown -R ubuntu:ubuntu /home/ubuntu/splunkforwarder"
Couldn't change ownership for /home/ubuntu/splunkforwarder/etc: Operation not permitted

Splunk> Needle. Haystack. Found.

Checking prerequisites...
        Checking mgmt port [8089]: open
        Checking conf files for problems...
        Done
        Checking default conf files for edits...
        Validating installed files against hashes from '/home/ubuntu/splunkforwarder/splunkforwarder-9.4.3-237ebb
d22314-linux-amd64-manifest'
        All installed files intact.
        Done
All preliminary checks passed.

Starting splunk server daemon (splunkd)...
==== AUTHENTICATING FOR org.freedesktop.systemd1.manage-units ===
Authentication is required to start 'SplunkForwarder.service'.
Authenticating as: ubuntu
Password:
==== AUTHENTICATION COMPLETE ===
Done
```

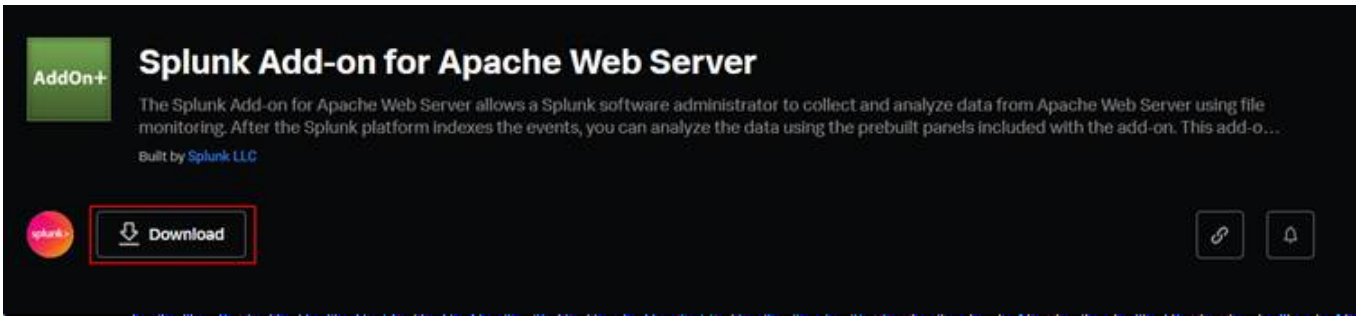
3. Install Splunk Add-on for Apache

Search for the appropriate Apache-related apps or add-ons on Splunkbase to enable log collection and analysis from Apache Web Servers within Splunk.



4. Download Splunk Add-on for Apache

- Go to Splunkbase and download the Splunk Add-on for Apache Web Server.



- Move it to the forwarder's etc/apps folder:

scp from local machine:

```
PS C:\WINDOWS\system32> scp C:\Users\pc\Downloads\splunk-add-on-for-apache-web-server_210.tgz ubuntu@192.168.1.17:/home/ubuntu
ubuntu@192.168.1.17's password:
splunk-add-on-for-apache-web-server_210.tgz                   100%   37KB  12.0MB/s   00:00
```

mv on the server:

```
ubuntu@apache:~$ mv splunk-add-on-for-apache-web-server_210.tgz /home/ubuntu/splunkforwarder/etc/apps/
```

- Extract the add-on:

```
ubuntu@apache:~/splunkforwarder/etc/apps$ tar -xf splunk-add-on-for-apache-web-server_210.tgz
```

This will create a directory like Splunk_TA_apache.

- Restart the forwarder:

```
ubuntu@apache:~/splunkforwarder/bin$ sudo ./splunk restart
Warning: Attempting to revert the SPLUNK_HOME ownership
Warning: Executing "chown -R ubuntu:ubuntu /home/ubuntu/splunkforwarder"
Stopping splunkd...
Shutting down.  Please wait, as this may take a few minutes.

Stopping splunk helpers...

Done.
splunkd.pid doesn't exist...

Splunk> Needle. Haystack. Found.

Checking prerequisites...
        Checking mgmt port [8089]: open
        Checking conf files for problems...
        Done
        Checking default conf files for edits...
        Validating installed files against hashes from '/home/ubuntu/splunkforwarder/splunkforwarder-9.4.3-237ebb
d22314-linux-amd64-manifest'
        All installed files intact.
        Done
All preliminary checks passed.

Starting splunk server daemon (splunkd)...
Done
```

5. Configure Log Monitoring

- Create the local folder if it doesn't exist:

```
ubuntu@apache:~/splunkforwarder/etc/apps/Splunk_TA_apache$ mkdir local
```

- Create inputs.conf:

```
ubuntu@apache:~/splunkforwarder/etc/apps/Splunk_TA_apache/local$ sudo nano inputs.conf
```

- Add this config:

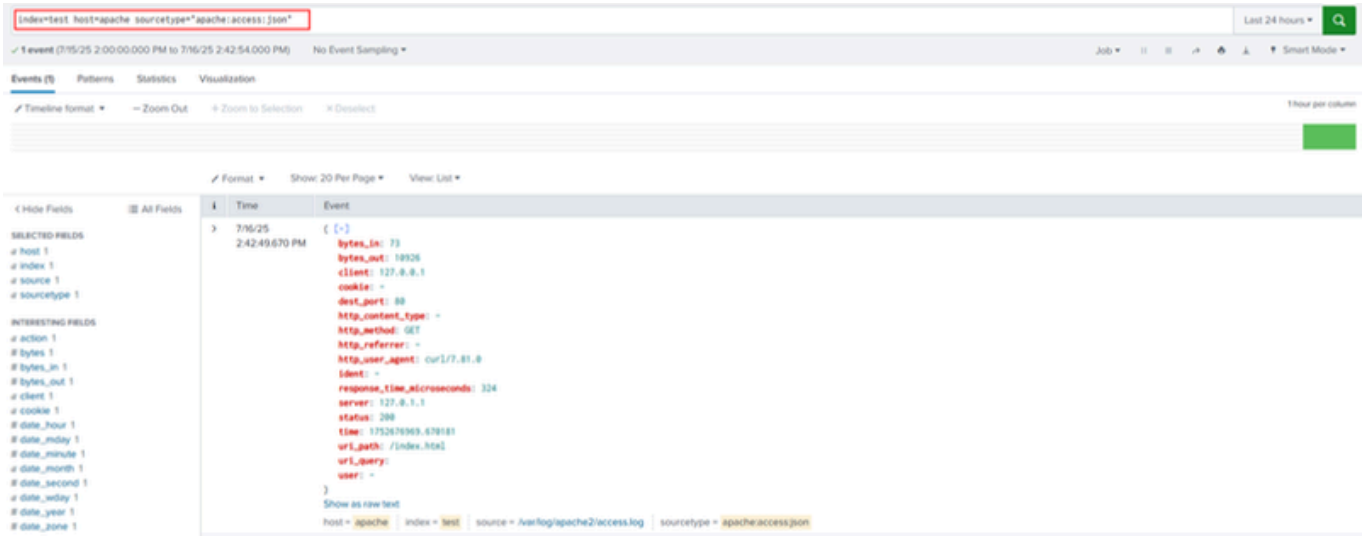
```
  GNU nano 6.2                                 inputs.conf
[monitor:///var/log/apache2/access.log]
sourcetype = apache:access:json
index = test
disabled = 0
```

- Save and restart:

```
ubuntu@apache:~/splunkforwarder/bin$ sudo ./splunk restart
[sudo] password for ubuntu:
Warning: Attempting to revert the SPLUNK_HOME ownership
Warning: Executing "chown -R ubuntu:ubuntu /home/ubuntu/splunkforwarder"
Stopping splunkd...
Shutting down.  Please wait, as this may take a few minutes.

Stopping splunk helpers...

Done.
splunkd.pid doesn't exist...

Splunk> Needle. Haystack. Found.

Checking prerequisites...
        Checking mgmt port [8089]: open
        Checking conf files for problems...
        Done
        Checking default conf files for edits...
        Validating installed files against hashes from '/home/ubuntu/splunkforwarder/splunkforwarder-9.4.3-237ebb
d22314-linux-amd64-manifest'
        All installed files intact.
        Done
All preliminary checks passed.

Starting splunk server daemon (splunkd)...
Done
```

6. Verify Logs in Splunk

- Go to Splunk Web.
- Open Search & Reporting.
- Run:



You should see your Apache logs in JSON format

Comprehensive Guide to Onboarding CSV Files

CSV files are everywhere simple, structured, and easy to work with. But when it comes to Splunk, you need to make sure the data is ingested properly so you can search and analyze it easily. Here's a step-by-step guide to help you do that using Indexed Extractions.

What Are Indexed Extractions?

Normally, Splunk reads each line of a file as a raw event. That means even the header (like rank,domain,tld) shows up as an event.

With Indexed Extractions, Splunk reads the header and uses it to extract fields from each line. So instead of raw lines, you get structured events like:
rank=1, domain=google.com, tld=com

```
ubuntu@ubuntu:~$ ls -la /var/log/top*
-rw-rw-r-- 1 ubuntu ubuntu 28941 Jul 17 13:00 /var/log/top-1000.csv
-rw-rw-r-- 1 ubuntu ubuntu 28941 Jul 18 10:45 /var/log/top-1000.txt
ubuntu@ubuntu:~$ head /var/log/top-1000.csv
# These are the top 1000 domains and their top level domains
rank,domain,tld
1,google.com,com
2,microsoft.com,com
3,www.google.com,com
4,netflix.com,com
5,cloud.netflix.com,com
6,prod.cloud.netflix.com,com
7,data.microsoft.com,com
8,ftl.netflix.com,com
```

- **Important:** All parsing and field extraction must happen on the Universal Forwarder. Settings on the Indexer won't work here.

Monitor Your CSV File

To tell Splunk to watch your CSV file for new data:

- Create top1000_csv_inputs and default folders
- Go to your app's inputs directory
- Create inputs.conf:

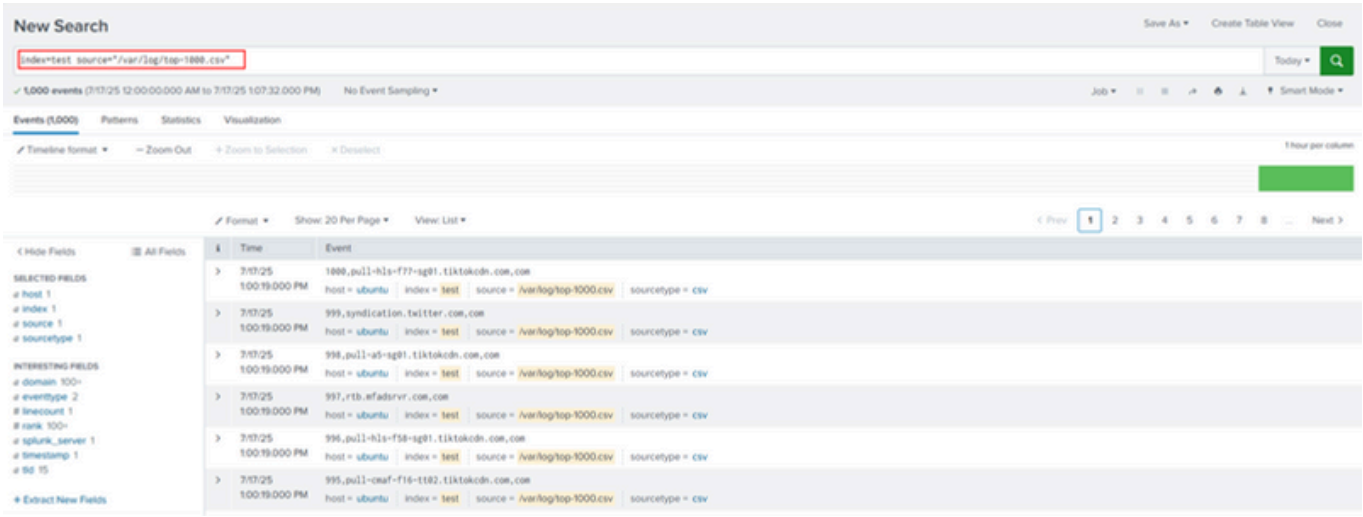
```
ubuntu@ubuntu:~$ cd ./splunkforwarder/etc/apps/
ubuntu@ubuntu:~/splunkforwarder/etc/apps$ mkdir top1000_csv_inputs
ubuntu@ubuntu:~/splunkforwarder/etc/apps$ cd top1000_csv_inputs/
ubuntu@ubuntu:~/splunkforwarder/etc/apps/top1000_csv_inputs$ mkdir default
ubuntu@ubuntu:~/splunkforwarder/etc/apps/top1000_csv_inputs$ cd default/
ubuntu@ubuntu:~/splunkforwarder/etc/apps/top1000_csv_inputs/default$ nano inputs.conf
```

- Add this stanza:

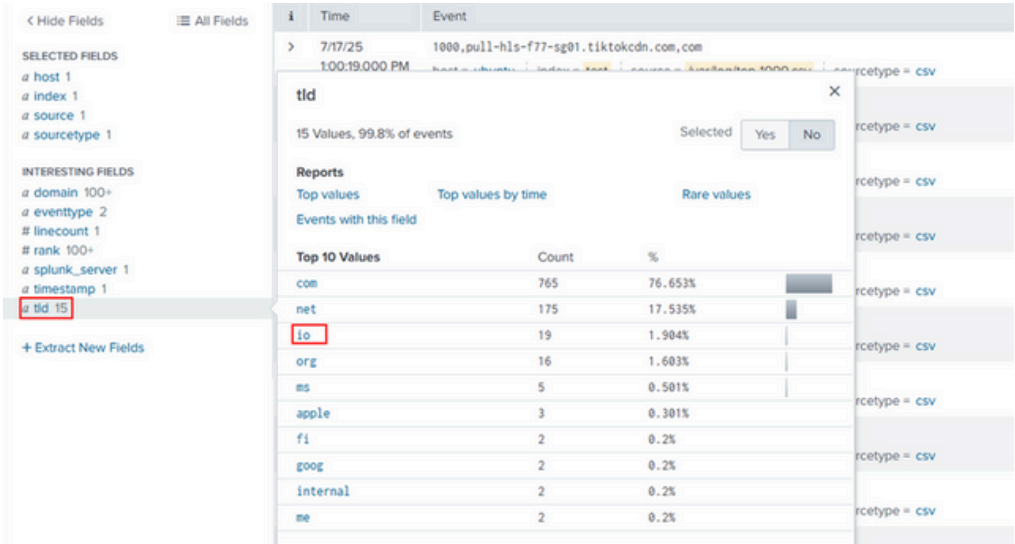
```
  GNU nano 6.2                                          inputs.conf *
[monitor:///var/log/top-1000.csv]
index = test
disabled = 0
```

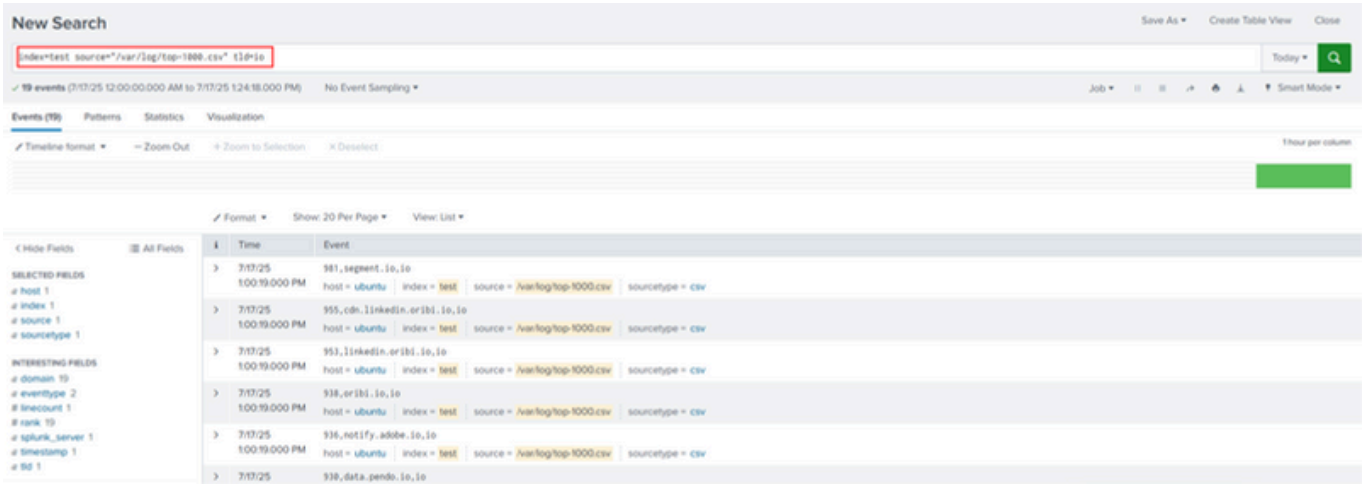
Verify Ingestion in Splunk

- Go to Splunk Web and search:



- Click on an event and check the Selected Fields. You should see fields like rank, domain, and tld.





Improve Field Extraction (props.conf)

If Splunk doesn't extract fields correctly, you can force it to treat the file as CSV:

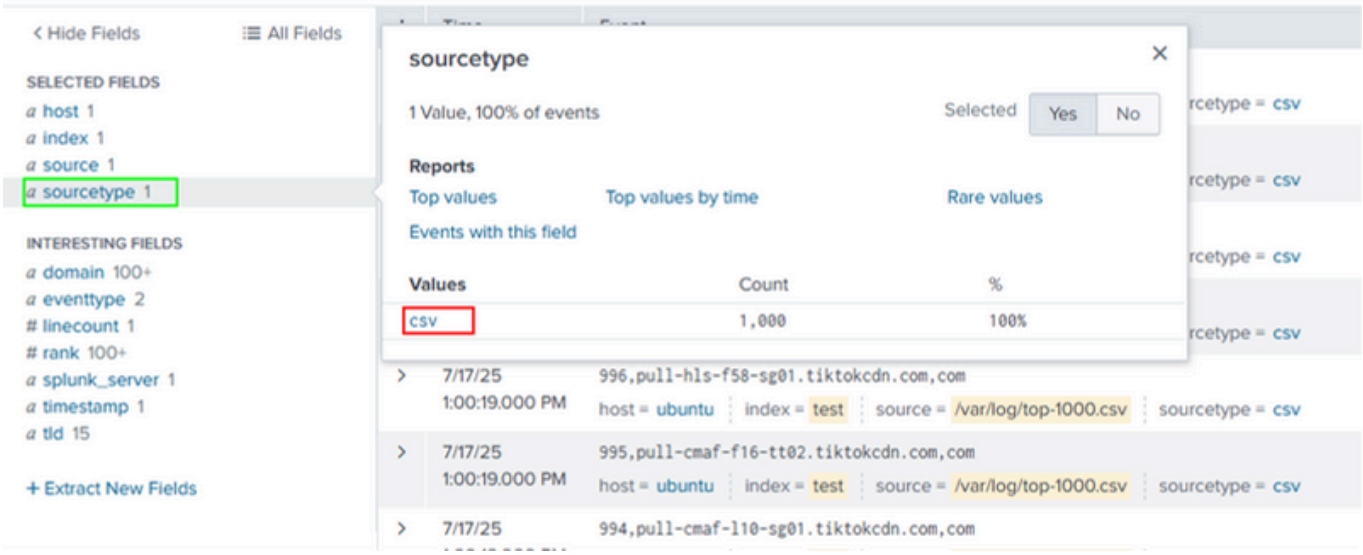
- Go to: ~/splunkforwarder/etc/system/default/
- Edit props.conf:

```
ubuntu@ubuntu:~/splunkforwarder/etc/system/default$ nano props.conf
```

- Add this:

```
[csv]
SHOULD_LINEMERGE = False
pulldown_type = true
INDEXED_EXTRACTIONS = csv
KV_MODE = none
category = Structured
description = Comma-separated value format. Set header and other settings in "Delimited Settings"
```

- Check:



Handle Multiple Files with Different Sourcetypes

If you have more than one file (e.g., .txt or other formats), give each one a unique sourcetype:

```
ubuntu@ubuntu:~/splunkforwarder/etc/system/default$  head /var/log/top-1000.txt
# These are the top 1000 domains and their top level domains
rank,domain,tld
1,google.com,com
2,microsoft.com,com
3,www.google.com,com
4,netflix.com,com
5,cloud.netflix.com,com
6,prod.cloud.netflix.com,com
7,data.microsoft.com,com
8,ftl.netflix.com,com
```

- Edit inputs.conf again:

```
ubuntu@ubuntu:~/splunkforwarder/etc/apps/top1000_csv_inputs/default$ nano ./inputs.conf
```

```
  GNU nano 6.2                                  ./inputs.conf *
[monitor:///var/log/top-1000.csv]
index = test
disabled = 0

[monitor:///var/log/top-1000.txt]
sourcetype = top_domains
index = test
crcSalt = splunk4analysts
disabled = 0
```

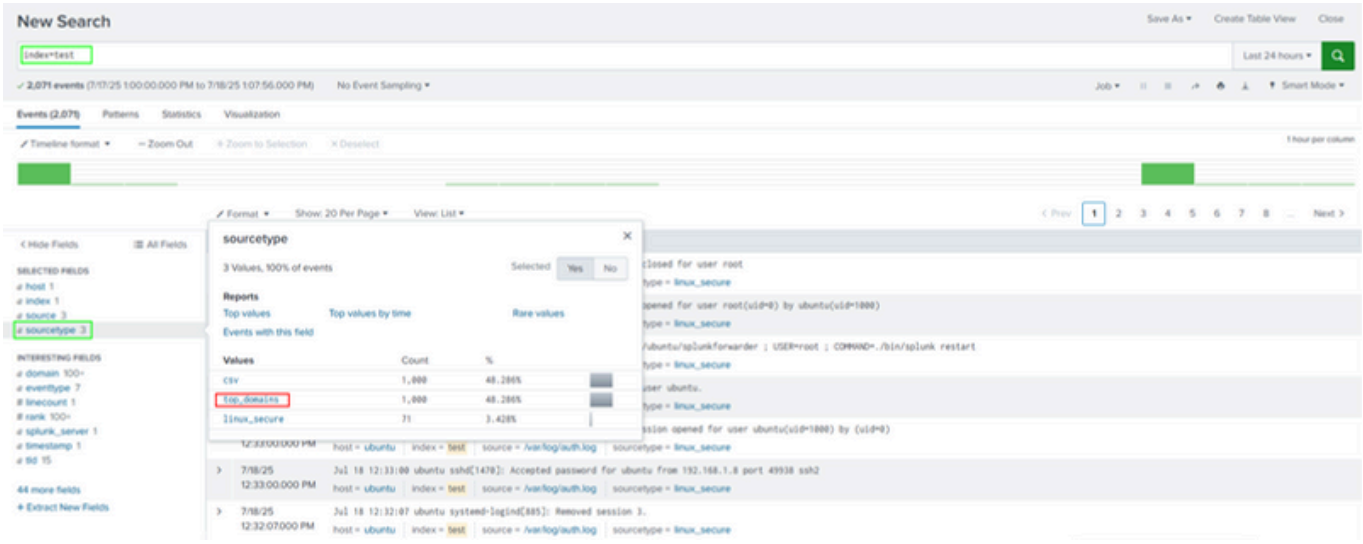
This helps you search and manage data more easily.

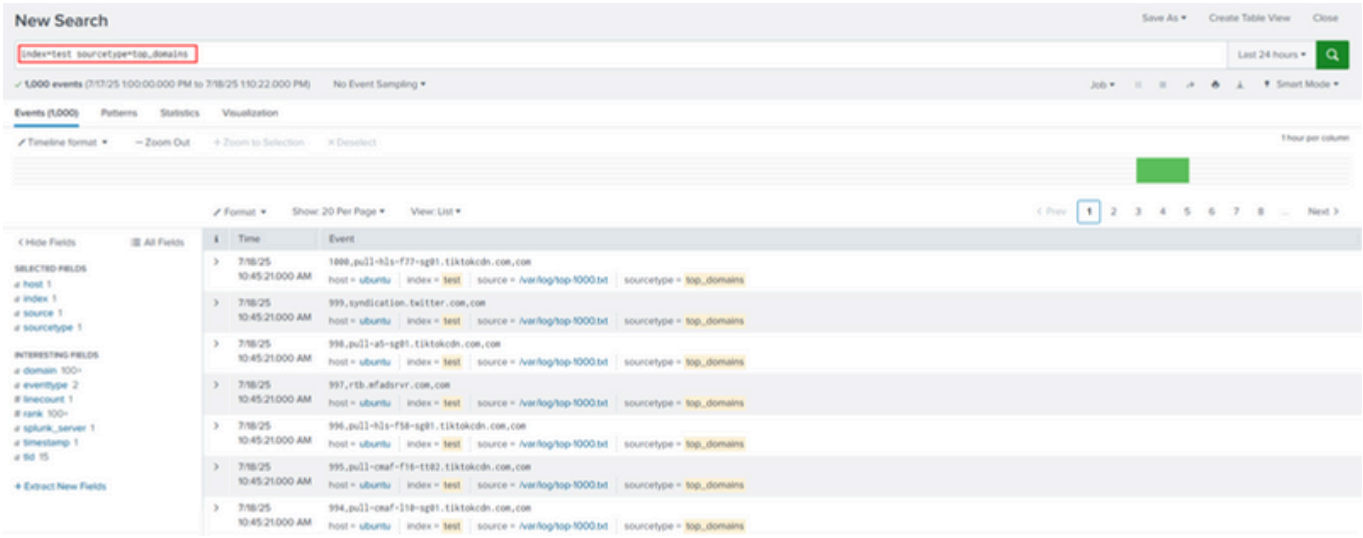
Restart Splunk and Confirm

- Restart the forwarder:

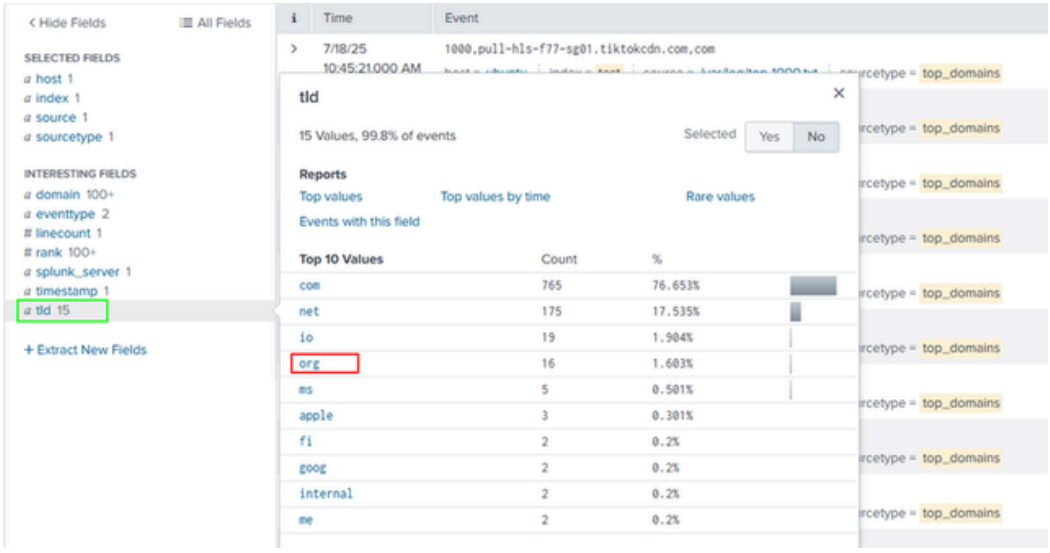
```
ubuntu@ubuntu:~/splunkforwarder$ sudo ./bin/splunk restart
[sudo] password for ubuntu:
Warning: Attempting to revert the SPLUNK_HOME ownership
Warning: Executing "chown -R ubuntu:ubuntu /home/ubuntu/splunkforwarder"
Stopping splunkd...
Shutting down.  Please wait, as this may take a few minutes.

Stopping splunk helpers...

Done.
```

- Go back to Splunk Web and search:





- Check if fields like tld are extracted correctly. You can even explore top values to confirm data quality.



Custom Data Sources and the "Great 8" Best Practices

When you're working with custom logs, like niche software, in-house apps, or unique formats, Splunk won't have a ready-made add-on. That's where custom sourcetypes and Technical Add-ons (TAs) come in.

To make sure Splunk parses your data correctly, you need to configure how events are broken, timestamped, and indexed. This is done using the "Great 8" parsing settings in props.conf.

The "Great 8" Parsing Settings Explained

Here are the 8 key settings you should always define when creating a custom sourcetype:

1. **TIME_PREFIX**
   - Tells Splunk where the timestamp starts.
   - Example: timestamp=" if your log looks like timestamp="2023-10-26..."
2. **TIME_FORMAT**
   - Defines the format of the timestamp.
   - Example: %Y-%m-%d %H:%M:%S for 2023-10-26 14:30:00
3. **MAX_TIMESTAMP_LOOKAHEAD**
   - How many characters Splunk should scan after TIME_PREFIX to find the timestamp.
4. **SHOULD_LINEMERGE**
   - Set to false if each log entry is one line. Helps performance.
5. **LINE_BREAKER**
   - Regex that defines where one event ends and the next begins.
   - Example: ([\r\n]+) for new lines.
6. **TRUNCATE**
   - Max size of a single event (in bytes). Prevents huge events from being indexed.
7. **EVENT_BREAKER**
   - Lets Splunk break events at the Universal Forwarder level (not just indexer).
8. **EVENT_BREAKER_ENABLE**
   - Enables the above setting. Set to true.

Example: Onboarding Ubuntu dpkg.log

Let's say you want to ingest /var/log/dpkg.log from an Ubuntu system.

1. Create App Directory

```
ubuntu@ubuntu:~/splunkforwarder/etc/apps$ mkdir -p dpkg/default
ubuntu@ubuntu:~/splunkforwarder/etc/apps$ cd dpkg/default/
```

2. Define Parsing Rules in props.conf

```
ubuntu@ubuntu:~/splunkforwarder/etc/apps/dpkg/default$ nano props.conf
```

- **props.conf Content for dpkg Logs**

```
  GNU nano 6.2                                  props.conf *
[ubuntu_dpkg_log]
TIME_PREFIX = ^
TIME_FORMAT = %Y-%m-%d %H:%M:%S
MAX_TIMESTAMP_LOOKAHEAD = 20
SHOULD_LINEMERGE = false
LINE_BREAKER = ([\r\n]+)
TRUNCATE = 2000
EVENT_BREAKER = ([\r\n]+)
EVENT_BREAKER_ENABLE = true
```

This configuration explicitly sets several key parsing parameters for the ubuntu_dpkg_log sourcetype:

- **TIME_PREFIX = ^**: Indicates the timestamp is expected at the beginning of each event.
- **TIME_FORMAT = %Y-%m-%d %H:%M:%S**: Specifies the timestamp format (e.g., 2023-10-26 14:30:00).
- **MAX_TIMESTAMP_LOOKAHEAD = 20**: Sets the maximum characters Splunk will scan for the timestamp after the TIME_PREFIX.
- **SHOULD_LINEMERGE = false**: Prevents multiple lines from being combined into a single event, indicating each log entry is a single line.
- **LINE_BREAKER = ([\r\n]+)**: Defines that a new line character signifies a new event, consistent with SHOULD_LINEMERGE = false.
- **TRUNCATE = 2000**: Sets the maximum event size to 2000 bytes, acting as a safeguard against overly large events.
- **EVENT_BREAKER = ([\r\n]+)**: Enables event breaking at the Universal Forwarder level based on new lines.
- **EVENT_BREAKER_ENABLE = true**: Activates the EVENT_BREAKER functionality on the forwarder.

3. Configure Input in inputs.conf

```
ubuntu@ubuntu:~/splunkforwarder/etc/apps/dpkg/default$ nano inputs.conf
```

```
  GNU nano 6.2                                  inputs.conf *
[monitor:///var/log/dpkg.log]
sourcetype = dpkg
index = test
disabled = 0
```

This configuration specifies:

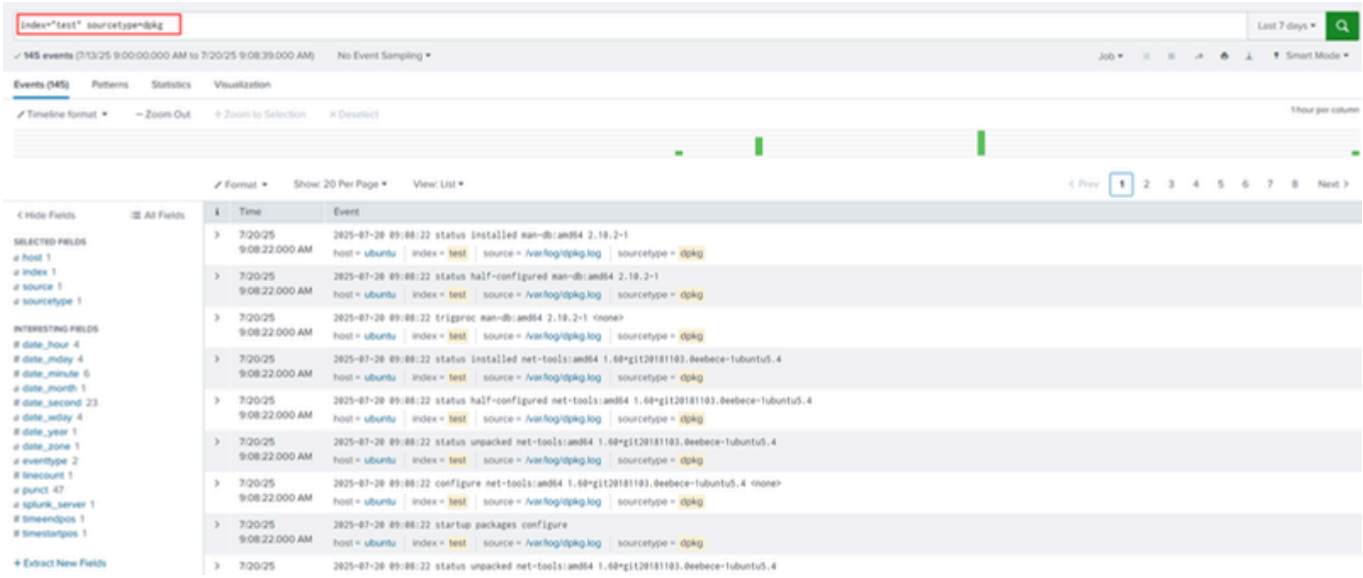
- **[monitor:///var/log/dpkg.log]:** Instructs Splunk to monitor the file /var/log/dpkg.log.
- **sourcetype = dpkg**: Assigns the dpkg sourcetype to the data from this log file, ensuring it uses the parsing rules defined in props.conf.
- **index = test**: Directs the ingested data to the test index in Splunk.
- **disabled = 0**: Ensures this input is active (0 means enabled).

4. Restart the Forwarder

```
ubuntu@ubuntu:~/splunkforwarder$ sudo ./bin/splunk restart
[sudo] password for ubuntu:
Warning: Attempting to revert the SPLUNK_HOME ownership
Warning: Executing "chown -R ubuntu:ubuntu /home/ubuntu/splunkforwarder"
Stopping splunkd...
Shutting down.  Please wait, as this may take a few minutes.

Stopping splunk helpers...

Done.
splunkd.pid doesn't exist...

Splunk> 4TW

Checking prerequisites...
        Checking mgmt port [8089]: open
        Checking conf files for problems...
        Done
        Checking default conf files for edits...
        Validating installed files against hashes from '/home/ubuntu/splunkforwarder/splu
nkforwarder-9.4.3-237ebbd22314-linux-amd64-manifest'
        All installed files intact.
        Done
All preliminary checks passed.

Starting splunk server daemon (splunkd)...
Done
```

5. Verify in Splunk Web

- Search:



You should see clean, timestamped events from dpkg.log, parsed using your custom sourcetype.

Extracting Data Fields using the EXTRACT Command

Splunk is powerful because it doesn't just store logs, it makes data searchable. One of the key ways it does this is through field extraction, which turns raw log lines into structured, searchable fields.

What Is Search-Time Field Extraction?

Unlike index-time extraction (which happens when data first enters Splunk), search-time extraction happens when you run a search. This means:

- You can define new fields anytime, even after data is already indexed.
- No need to re-ingest or re-index your data.
- Super flexible, perfect for evolving log formats or changing analysis needs.

Things to Keep in Mind

- Search-time extraction uses CPU on the Search Head every time you run a query.
- In large environments, make sure field extraction configs are consistent across all Search Heads, especially in clusters.

How to Extract Fields in Splunk

Splunk offers three main methods to extract fields:

1. EXTRACT (Inline in props.conf)

- Define regex directly in props.conf under your sourcetype.
- Best for simple to medium complexity extractions.

2. REPORT (Using transforms.conf)

- Use props.conf + transforms.conf for more complex logic or reusable regex.
- Great for shared rules across multiple sourcetypes or when using lookups.

3. Automatic Field Discovery

Splunk can auto-extract fields from structured formats like:

- Key-Value pairs: user=jsmith status=success
- JSON: { "user": "jsmith", "status": "success" }
- XML: <user>jsmith</user>

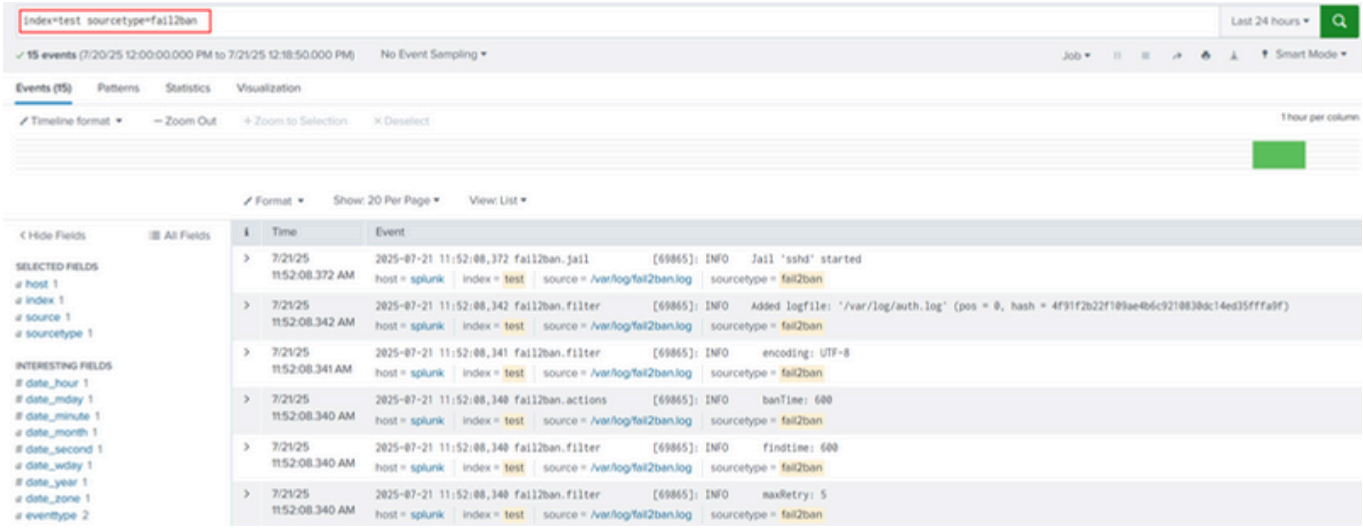
No config needed, Splunk does the work for you!

Step-by-Step: Extracting Fields via UI

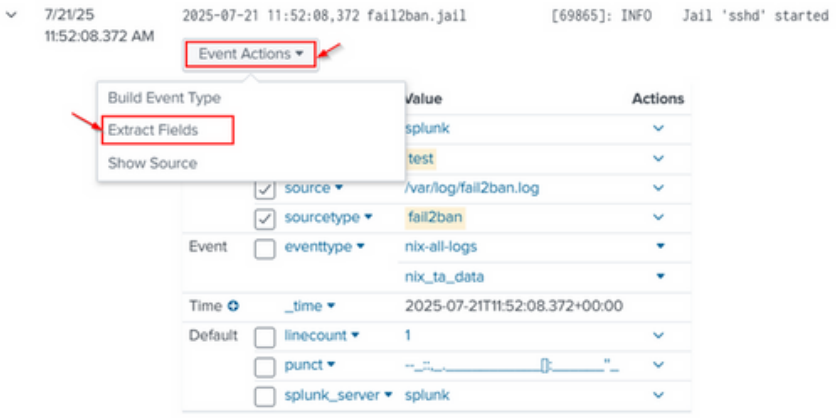
```
splunk@splunk:~$ tail /var/log/fail2ban.log
2025-07-21 11:52:08,288 fail2ban.jail           [69865]: INFO    Creating new jail 'sshd'
2025-07-21 11:52:08,305 fail2ban.jail           [69865]: INFO    Jail 'sshd' uses pyinotify {}
2025-07-21 11:52:08,311 fail2ban.jail           [69865]: INFO    Initiated 'pyinotify' backend
2025-07-21 11:52:08,313 fail2ban.filter         [69865]: INFO      maxLines: 1
2025-07-21 11:52:08,340 fail2ban.filter         [69865]: INFO      maxRetry: 5
2025-07-21 11:52:08,340 fail2ban.filter         [69865]: INFO      findtime: 600
2025-07-21 11:52:08,340 fail2ban.actions        [69865]: INFO      banTime: 600
2025-07-21 11:52:08,341 fail2ban.filter         [69865]: INFO      encoding: UTF-8
2025-07-21 11:52:08,342 fail2ban.filter         [69865]: INFO    Added logfile: '/var/log/auth.log' (pos = 0, has
h = 4f91f2b22f109ae4b6c9210830dc14ed35fffa9f)
2025-07-21 11:52:08,372 fail2ban.jail           [69865]: INFO    Jail 'sshd' started
splunk@splunk:~$ cd ./splunk/etc/apps/fail2ban/default/
splunk@splunk:~/splunk/etc/apps/fail2ban/default$ cat props.conf
[fail2ban_logs]
TIME_PREFIX = ^
TIME_FORMAT = %Y-%m-%d %H:%M:%S,%3N
MAX_TIMESTAMP_LOOKAHEAD = 24
SHOULD_LINEMERGE = false
LINE_BREAKER = ([\r\n]+)
TRUNCATE = 10000
EVENT_BREAKER = ([\r\n]+)
EVENT_BREAKER_ENABLE = true
```

1. Search your data

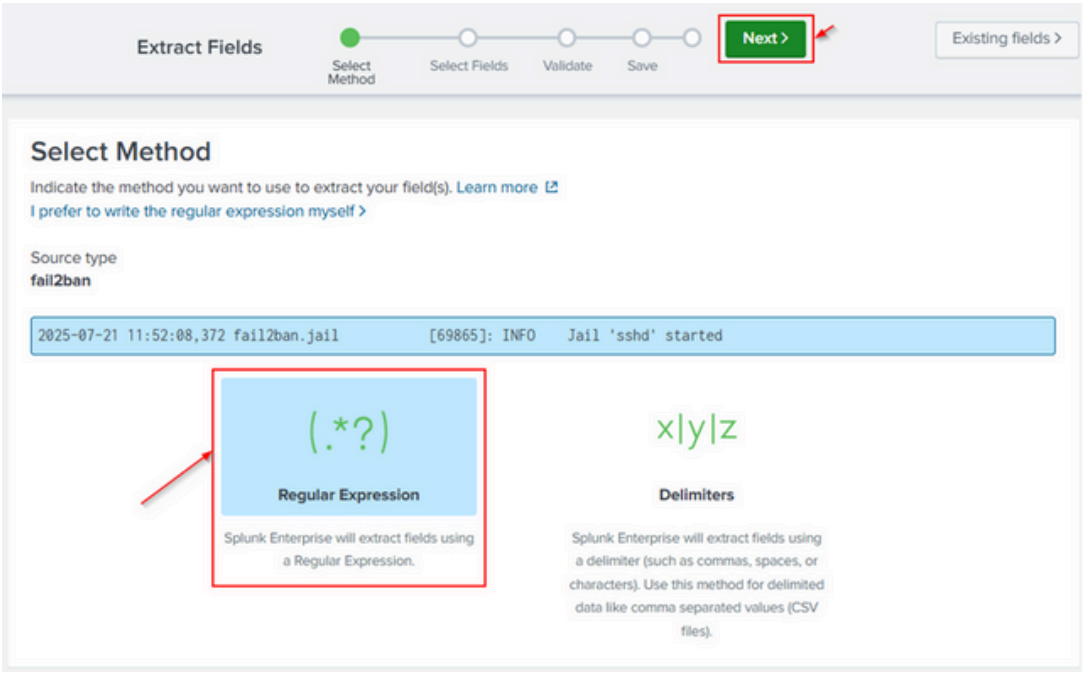
Example:



2. Click “Event Actions” → “Extract Fields”



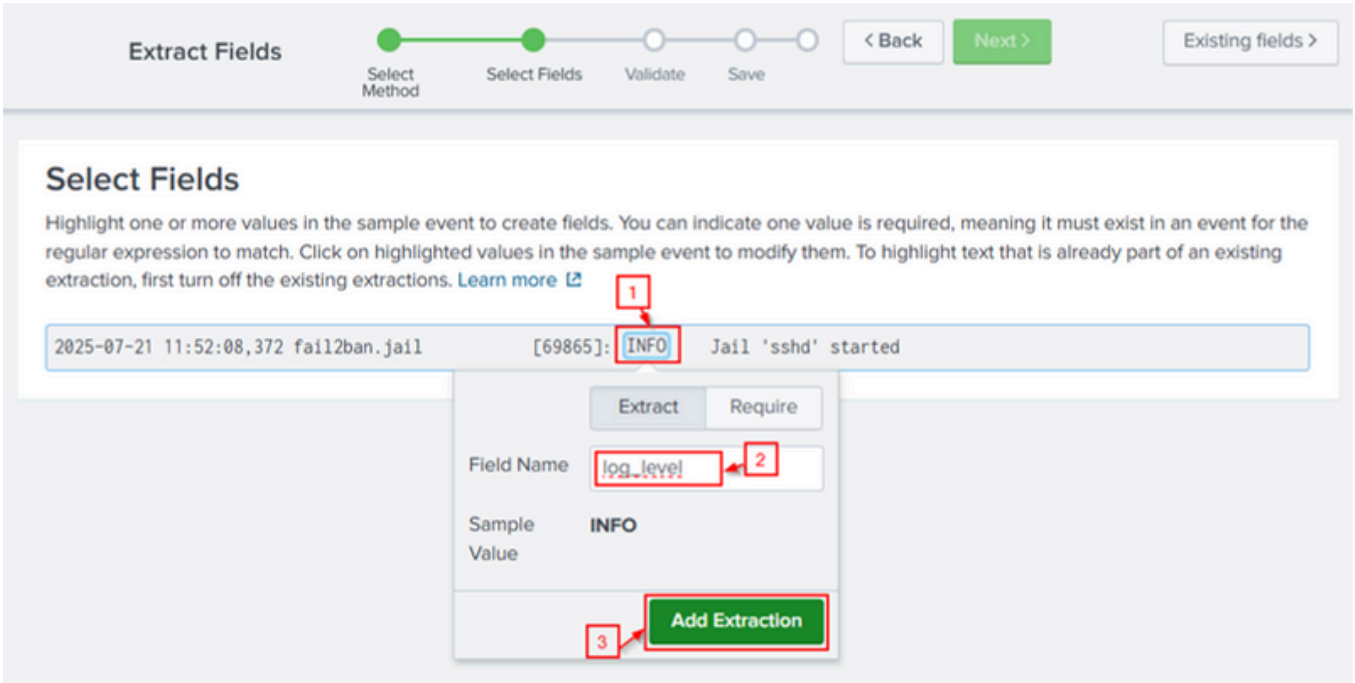
3. Choose “Regular Expression” method



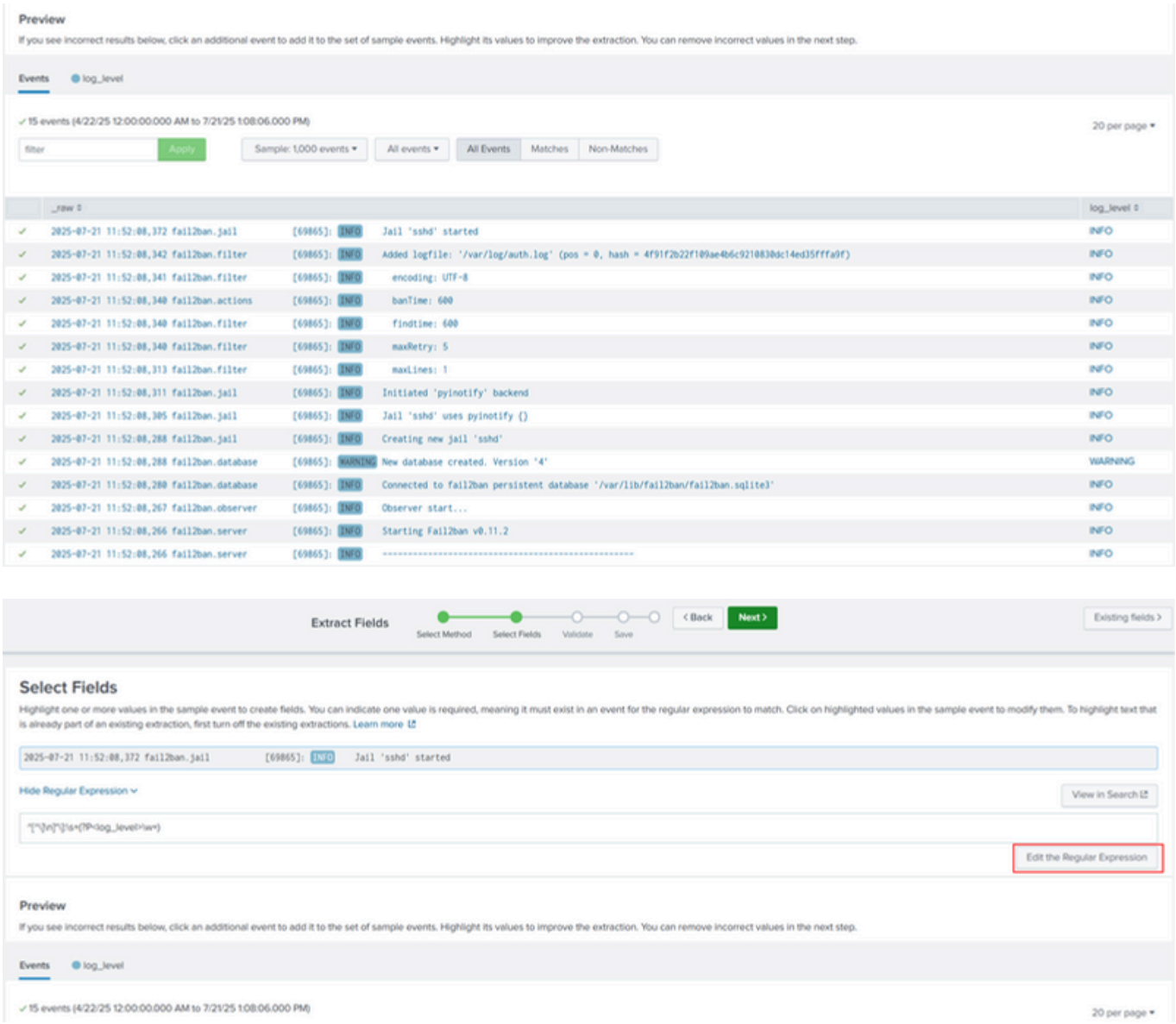
4. Highlight the value you want to extract

Example: highlight INFO to create a field called log_level.

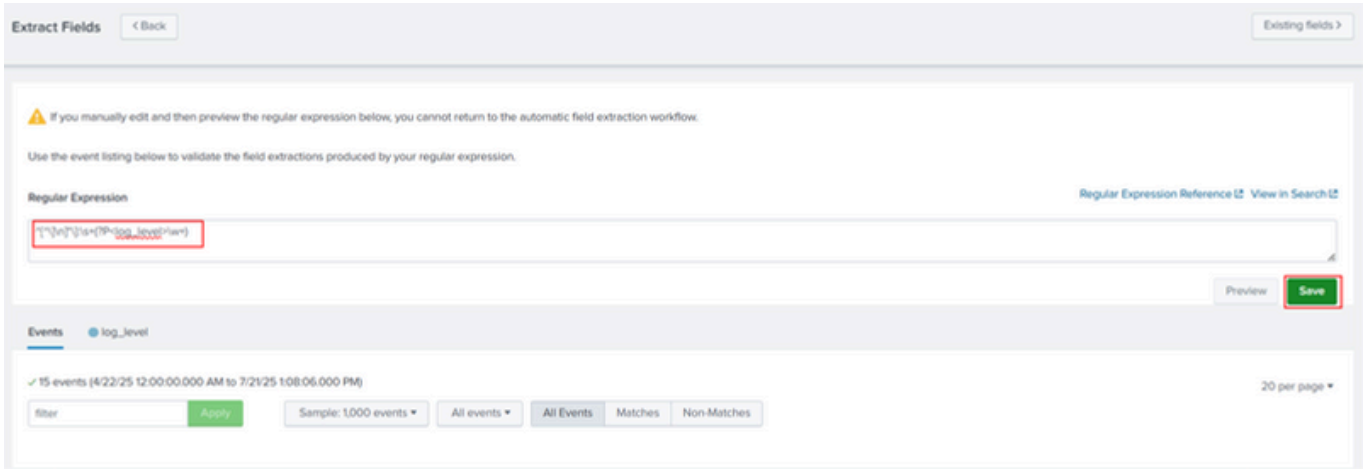
5. Name the field and click “Add Extraction”

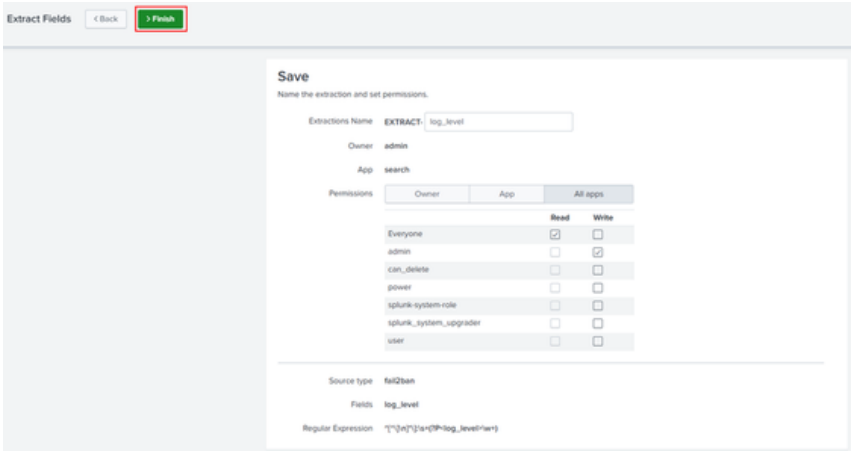


6. Preview and refine the regex if needed

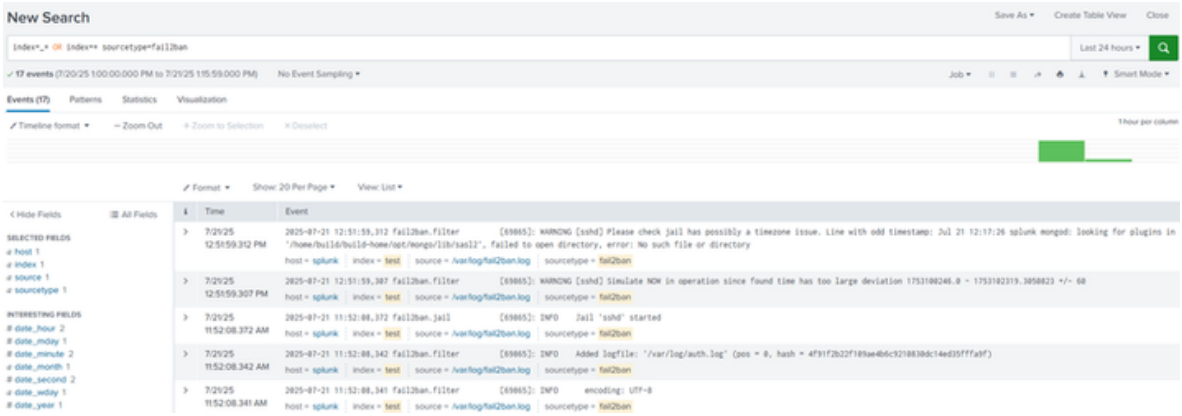


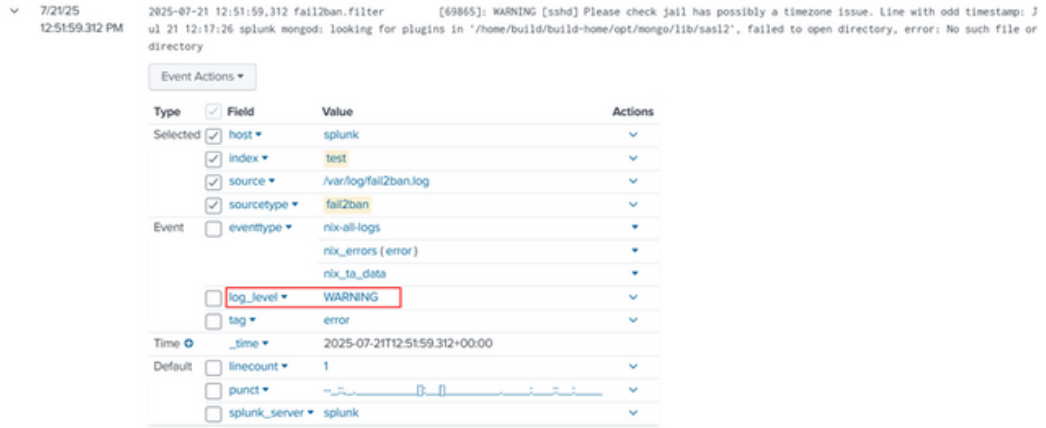
7. Save the extraction and set permissions





8. Explore your new field in search results





Extracting Data Fields using the REPORT Command

Why Use REPORT for Field Extraction in Splunk?

When working with custom log formats in Splunk, like **fail2ban logs** or other non-standard sources, you often need to extract fields using regular expressions (regex). Splunk gives you two main ways to do this: EXTRACT and **REPORT**.
While EXTRACT is great for quick setups, **REPORT** is the better choice when you want clean, reusable, and scalable configurations.

Benefits of Using REPORT

1. Regex Reusability
Define your regex once in transforms.conf and reuse it across multiple sourcetypes in props.conf.
2. Modular Configuration
Keeps your regex logic separate from sourcetype definitions — easier to manage and troubleshoot.
3. Advanced Field Mapping
Use FORMAT to assign names to regex capture groups, making your field extraction more readable and precise.

Example: Extracting Fields from fail2ban Logs

1. Define the Extraction in transforms.conf

```
splunk@splunk:~/splunk/etc/apps/fail2ban/default$ nano transforms.conf
```

```
  GNU nano 6.2                                transforms.conf
[fail2ban_fields]
REGEX = ^(?<timestamp>\d{4}-\d{2}-\d{2}\s+\d{2}:\d{2}:\d{2},\d{3})
FORMAT = timestamp::$1 component::$2 pid::$3 level::$4 jail::$5 message::$6
```

- This regex captures key parts of the log and maps them to field names like timestamp.

2. Apply the Extraction in props.conf

```
splunk@splunk:~/splunk/etc/apps/fail2ban/default$ nano props.conf
```

```
 GNU nano 6.2                                    props.conf
[fail2ban]
SHOULD_LINEMERGE = false
REPORT-fail2ban = fail2ban_fields
TIME_PREFIX = ^
TIME_FORMAT = %Y-%m-%d %H:%M:%S,%3N
MAX_TIMESTAMP_LOOKAHEAD = 24
```

- This tells Splunk to apply the fail2ban_fields extraction to all events with sourcetype=fail2ban.

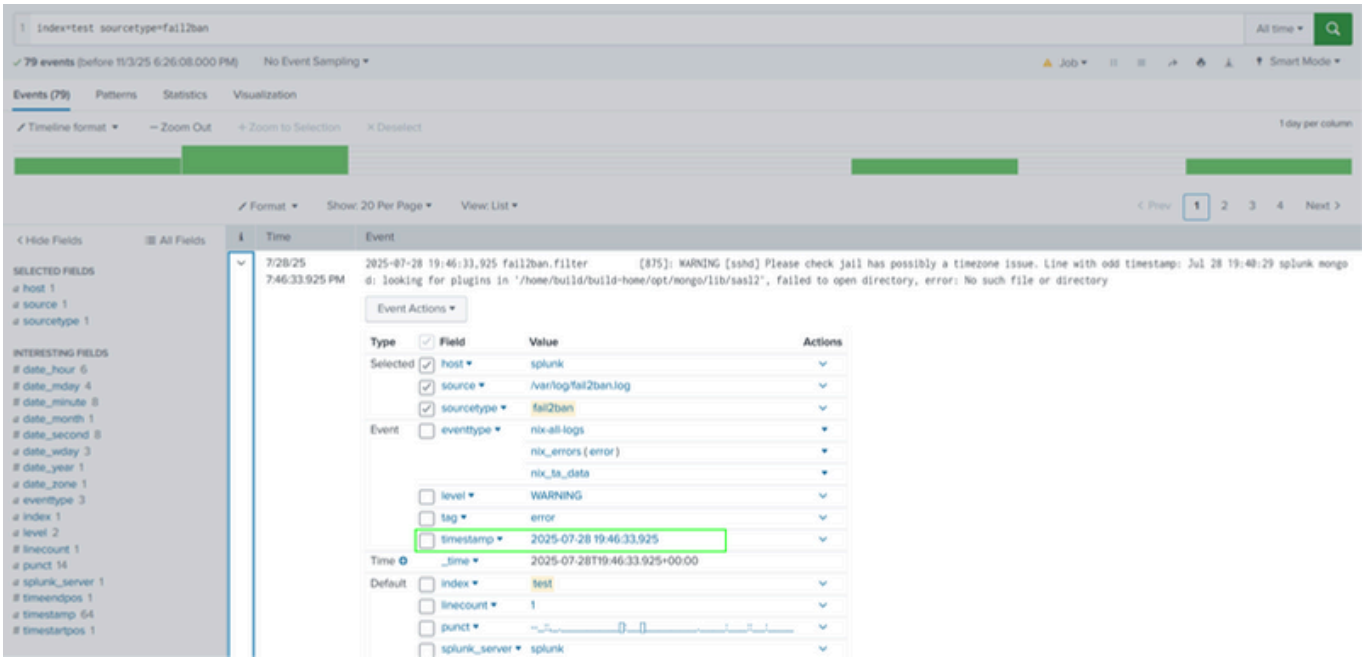
3. Restart Splunk to Apply Changes

```
splunk@splunk:~/splunk/etc/apps/fail2ban/default$ sudo ../../../../bin/splunk restart
```

- Note: The relative path is used because you're deep inside the app directory.

4. Verify in Splunk Search

Search:



- You should now see fields like timestamp in the left sidebar under Selected Fields, confirming that your extraction is working!