CRIBL NOTES on

U.S. $FREE

STREAM CHEAT SHEET

Version 2.0

Stream Cheat Sheet

Cribl

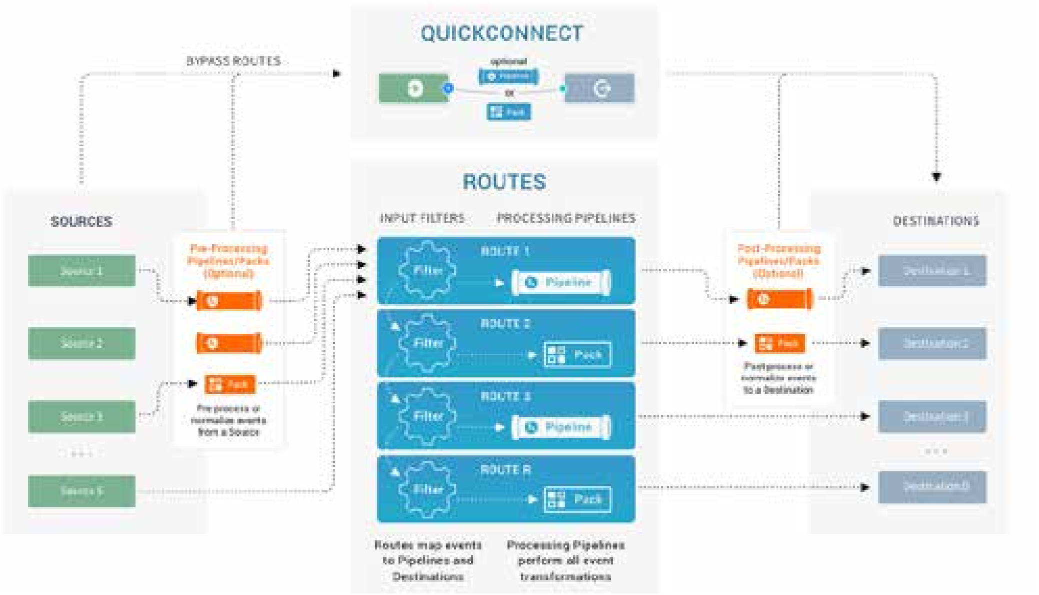
Basic Concepts

Sources

Cribl Stream can process data from various metrics, logs, traces, and generic event sources, including Splunk, HTTP, Elastic Beats, Kinesis, Kafka, TCP JSON etc. Depending on the Source, both **push** and **pull** methods are supported.

Destinations

Cribl Stream can send data to various Destinations, including Exabeam, Splunk, SignalFx, Kafka, Elasticsearch, Kinesis, InfluxDB, Snowflake, Databricks, Honeycomb, Azure Blob Store, Azure EventHubs, TCP JSON, Wavefront, and many others. Destinations can be streaming (events are sent in real time) or non-streaming (events are sent in batches).


QUICKCONNECT
BYPASS ROUTES
optional
Pipeline
or
Pack
ROUTES
INPUT FILTERS
PROCESSING PIPELINES
SOURCES
Source 1
Source 2
Source 3
Source 5
Pre-Processing Pipelines/Packs (Optional)
Pack
Pre-process or normalize events from a Source
ROUTE 1
Filter
Pipeline
ROUTE 2
Filter
Pack
ROUTE 3
Filter
Pipeline
ROUTE R
Filter
Pack
Routes map events to Pipelines and Destinations
Processing Pipelines perform all event transformations
Post-Processing Pipelines/Packs (Optional)
Pack
Postprocess or normalize events to a Destination
DESTINATIONS
Destination 1
Destination 2
Destination 3
Destination D

Routes

Routes evaluate incoming events against **filter** expressions to find the appropriate **Pipeline** to send them to. Routes are evaluated in order, and a Route can be associated only with one Pipeline and one Destination.

Pipelines

A series of **Functions** is called a Pipeline, and the order in which they are executed matters. Events are delivered to the beginning of a Pipeline by a Route, and as they're processed by a Function, they are passed onto the next Function down the line. Events only move forward, towards the end of the Pipeline and eventually out of the system.

Functions

A Function is a piece of **JavaScript** code that executes on an event, and it encapsulates the smallest amount of processing that can happen to that event. E.g., a Function can replace the term `foo` with `bar` on each event. Another one can hash `bar`, and yet another can add a field, say, `dc=jfk-42` to any event from host `us-nyc-42.cribl.io`.

Packs

Packs enable Cribl Stream administrators and developers to pack up and share complex configurations and workflows across multiple Worker Groups, or across organizations. Packs can contain everything between a Source and a Destination: Routes (Pack-level), Pipelines (Pack-level), Functions (built-in and custom), Sample data files, Knowledge objects (Lookups, Parsers, Global Variables, Grok Patterns, and Schemas). Wherever you can reference a Pipeline, you can specify a Pack!

Collector Sources

Collector Sources are designed to ingest data intermittently, rather than continuously. You can use Collectors to dispatch on-demand (ad hoc) collection tasks, which fetch or "replay" (re-ingest) data from local or remote locations. Collectors also support scheduled periodic collection jobs that can make batch collection of stored data more like continual processing of streaming data. Supported Collectors include (but are not limited to): Filesystem / NFS, Azure Blob, Google Cloud Storage, S3 (including MinIO), REST, and Splunk Search.

QuickConnect

QuickConnect is a visual rapid-development UI. With it, you can connect Cribl Stream inputs (Sources) to outputs (Destinations) through simple drag-and-drop. You can then insert Pipelines or Packs into the connections, to take advantage of Cribl Stream's full range of data-transformation Functions. Or you can omit these processing stages entirely, to send incoming data directly to Destinations – with minimal configuration fuss.

Scaling and Sizing

Expected resource utilization will be proportional to how much overall processing is occurring. For instance, a Function that adds a static field will likely perform faster than one that applies a regex to finding and replacing a string. Cribl's current sizing guidance is **400GB thru/day/CPU**. For example:

Input:	**4TB/day**
Outputs:	**4TB/day to S3** **2TB/day to Splunk**
Total thru:	**10TB/day**
Est. CPUs:	**25 (10TB/400GB)**

Basic Concepts (cont.)

Cribl.Cloud

The fast alternative to downloading and self-hosting Cribl Stream software is to launch Cribl.Cloud. This SaaS version, whether free or paid, places the Leader and the Worker Nodes/Edge Nodes in Cribl.Cloud, where Cribl assumes responsibility for managing the infrastructure.

Event Model

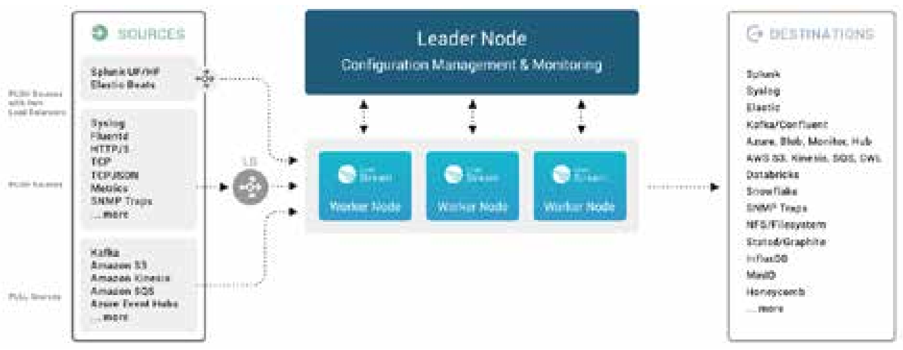
All data processing is based on discrete data entities commonly known as **events**. An event is generally defined as a collection of key/value pairs (fields). Some Sources deliver discrete events directly, while others might deliver bytestreams that need to be broken up by Event Breakers. The internal representation of a Cribl Stream event looks like this:

```
{
  "_raw": "<body of non JSON parse-able
event>",
  "_time": "<timestamp in UNIX epoch
format>",
  "__inputId": "<Source of the event>",
  "__other1": "<Internal field1>",
  "__other2": "<Internal field2>",
  "__otherN": "<Internal fieldN>",
  "key1": "<value1>",
  "key2": "<value2>",
  "key3": "<value3>",
  "keyN": "<valueN>",
  "...": "..."
}
```

Fields that with start with a double underscore are internal to Stream. For example, syslog sources add both an `__inputId` and a `__srcIpPort` field to each event. Internal fields can be used in a Pipeline, but are not passed down to Destinations. If an event cannot be JSON-parsed, all of its content will be assigned to the `_raw` field. If a timestamp is not configured, or cannot be extracted from an event, Stream will assign the current time (in UNIX epoch format) to `_time`.

Deployments

When data volume is low, and/or the amount of processing is light, a single-instance deployment may be sufficient. To accommodate higher volume, increased processing complexity, and increased availability, Cribl Stream can be scaled up and out across multiple instances. This is known as a **distributed deployment**. Distributed deployments are not limited to on-premises only or Cribl.Cloud only; Stream is also capable of **hybrid deployments**.



Filters and Value Expressions

You can use JavaScript filters and other value expressions to configure Stream’s Routes and built-in Functions. Expressions are syntactically valid units of code that resolve to a **value**. Conceptually, Stream supports two types of expressions: Some **assign a value** to a field – e.g., `myAnswer=42`. Others **evaluate to a value**, – e.g., `(Math.random() * 42)`. Filters are expressions that must evaluate to either true (or **truthy**) or false (or **falsy**). You can use filters in Routes to select a subset of incoming data flow, and in Functions to scope or narrow down their applicability.

Some simple examples:

Filter: *Check if incoming events are from host* `foo` *or filename ends in* `.log`*:*

```
host=='foo' || source.endsWith('.log')
```

Expression: *Assign field* `sourcetype` *the value of* `cisco:asa` *if string* `%ASA` *is in* `_raw`*, else leave it as is.*

```
/%ASA/.test(_raw) ? 'cisco:asa' :
sourcetype
```

Performance Tips

Start On Boot (systemd)

Cribl Stream can be configured to start at boot time with **systemd**. To do this, run the `boot-start` command. Make sure you first create a user you want to specify to run Cribl Stream.

Example: To run Cribl Stream on boot as existing user `cribl` use:

```
sudo $CRIBL_HOME/bin/cribl
boot-start enable -m systemd -u
cribl
```

The above will install a unit file named `cribl.service`, and will start Cribl Stream at boot time as user `cribl`.

Note: A `-configDir` option can be used to specify where to install the unit file. If not specified, this location defaults to /etc/systemd/system/.*

It may be necessary to change ownership for the Cribl Stream installation (`[sudo] chown -R cribl $CRIBL_HOME`). Finally, enable Stream to ensure that the service starts on system boot (`[sudo] systemctl enable cribl`)

Available systemctl commands are: `systemctl [start|stop|restart|status] cribl`

JSON.parse(_raw)

JSON events are received as strings in Cribl Stream. In order to improve performance (and reduce event size) try adding an Eval function to the beginning of your pipeline where **Name** is `_raw` and **Value Expression** is set to `JSON.parse(_raw)`. This will quickly convert the JSON back from a string (faster than using a parser) AND slightly shrink the overall event!

Regex Lookups

When using `C.LookupRegex` be wary of empty new lines. Regex lookups return true when a file has a dangling new line since these are treated as a wildcard. So remember: When making lookup files -- don't leave an empty line at the end!

Filtering Function Performance

The filters in your Cribl Stream Routes and Pipelines are like the gasoline in your car's engine. The better the fuel, the better the engine runs. The better your Stream filters, the faster your Routes and Pipelines can process observability data. Observability at scale requires careful attention to minor performance items, such as the choice of the function in your filter. A good rule of thumb is: regex matching functions such as `match`, `test`, `search` will typically take more CPU to process than string matching functions such as `indexOf`, `includes`, and `startsWith`, etc.

_raw.split

Multi-line logs and multi-value arrays can be tough to deal with. Navigate the logs easier by adding an Eval to the beginning of your pipeline where **Name** is `_raw` and **Value Expression** is set to `_raw.split('\n')`. This will quickly cut up the multi-line log file for easy parsing later on. You can even reference specific lines in the log by using `_raw.split('\n')[i]` and substituting `i` with the desired line!

Using Built-in Functions

Stream ships with a growing collection of highly configurable, out-of-the-box Functions. Below, we list key built-in Functions by purpose, followed by available JavaScript methods and Cribl expressions.

Create, remove, update, rename fields Functions: **Eval, Rename, Lookup, Regex Extract, Grok**

Find & Replace, including basic sed-like, obfuscate, redact, hash etc.: **Mask, Eval**

Add GeoIP information to events: **Lookup, GeoIP**

Extract fields from structured and unstructured events: **Regex Extract, Parser**

Extract and assign timestamps: **Auto Timestamp**

Drop events: **Drop, Regex Filter, Sampling, Suppress, Dynamic Sampling**

Sample events
(e.g., high volume, low value data): **Sampling, Dynamic Sampling**

Suppress events
(e.g., remove duplicates etc.): **Suppress**

Convert JSON arrays or XML elements into own events: **Unroll, JSON Unroll, XML Unroll**

Serialize events to CEF format
(send to various SIEMs): **CEF Serializer**

Serialize / change format
(e.g., convert JSON to CSV): **Serialize**

Flatten nested structures
(e.g., nested JSON): **Flatten**

Aggregate events in real-time
(i.e. statistical aggregations): **Aggregations**

Convert events to metrics format: **Publish Metrics.**

Commonly Used Functions

Function	Examples		
	DESCRIPTION	FIELD NAME	VALUE EXPRESSION
Eval	Add a field called source and set it to **mySource**	source	'mySource'
	Change status to success if code is **200**	status	code==200 ? 'success' : status
	Set location field to **city, state**	location	`${city}, ${state}`
	Replace **.com** with **.net** in **url**	url	url.replace(/\.com/, '.net')
	Set **private** to **yes** if **myip** is on private range	private	C.Net.isPrivate('10.10.2.0') ? 'yes' : 'no'
	Create an array field called **myField**	myField	['aa', 'bb', 'cc','dd']
	Convert value of **classname** to lowercase	classname	classname.toLowerCase()

Function	Examples		
	DESCRIPTION	MATCH REGEX	REPLACE EXPRESSION
Mask	Remove phone numbers from events	phonenumber=\d+	''
	Remove comments (lines that start with **#**)	^#.*$ /m	''
	Replace **sensitive** with **REDACTED**	sensitive	'REDACTED'
	Remove **description** from wineventlogs	This event is generated[\s\S]+$	'DESCRIPTION REMOVED'
	Redact last octet of an IPv4 address	(\d+\.\d+\.\d+\.)\d+	`${g1}xxx`
	MD5 hash a credit card number	(creditcard=)(\d+)	`${g1}${C.Mask.md5(g2)}`

Function	Examples	
	Sample Event: 2020-04-20 16:20:00 input=tcpjsonin rate=42 host=555.example.com region=us-east state=nj city=edgewater	
Regex Extract	Extract only **input** and **rate** fields	input=(?<input>\w+)\s+rate=(?<rate>\d+)
	Extract all KV pairs in the event	(?<_NAME_0>[^\s]+)=(?<_VALUE_0>[^\s]+)

Cribl Stream ships with a Regex Library that contains a set of pre-built common regex patterns.
Example: IPv4 Address - (?<!\d)(?:(?:[01]?\d\d?|2[0-4]\d|25[0-5])\.){3}(?:[01]?\d\d?|2[0-4]\d|25[0-5])(?!\d)

Commonly Used Functions (cont.)

Function	Examples	
	DESCRIPTION	FILTER EXPRESSION
Drop	Drop all **DEBUG** events	`_raw.includes('DEBUG')`
	Drop all **DEBUG** events from host **myhost**	`_raw.includes('DEBUG') && host=='myHost'`
	Drop 50% of all events (poor man's sampler)	`Math.random() > 0.5`
	Drop all events with length less than 42 bytes	`_raw.length < 42`

Custom Code Function

If you need to operate on data in a way that can't be accomplished with Cribl Stream's out-of-the-box Functions, the Code Function enables you to encapsulate your own JavaScript code. This Function is available in Cribl Stream 3.1+, and imposes some restrictions for security reasons.

Considerations

Generally speaking, anything forbidden in JavaScript strict mode is forbidden in the context of the Code Function. Specifically, the following are not allowed: `console`, `eval`, `uneval`, `Function` (constructor), `Promises`, `setTimeout`, `setInterval`, `global`, `globalThis`, and `window`. All JavaScript loops and statements are allowed: `for`, `for-of`, `while`, `do-while`, `switch`, etc.

The Code Function watches user-defined functions to detect infinite loops that would cause processing to hang. To limit the number of iterations allowed per instance of your Code Function, adjust the **Advanced Settings** >**Maximum number of iterations** option. This defaults to `5,000`; the maximum number allowed is `10,000`. Once the limit is reached, the Code Function will stop processing whatever is after the statement that exhausted the allowed maximum.

Example Event Data

Below is an example event that will be referenced in the **Function Examples** table. You can try out the below functions by pasting the `cpus` array from the example event into an `Eval` function at the top of a pipeline with a field titled `cpus`.

```
{
 "cpus": [
  {"number": 1, "name": "CPU1", "value": 2.3},
  {"number": 2, "name": "CPU2", "value": 3.1},
  {"number": 3, "name": "CPU3", "value": 5.1},
  {"number": 4, "name": "CPU4", "value": 1.3}
 ],
 "arch": "Intel x64"
}
```

Function Examples

DESCRIPTION	EXPRESSION	NOTES

Accessing Fields in an Event	`__e['field-name']`	In other words, think of your code executing in a context like this:
		`function(__e: Event) {`
		` // your code here`
		`}`

Eval a Field	`__e['test'] = 'Hello, Goats!'`	Create a field `test` with the value `Hello, Goats!`
JSON Filter	`__e['cpus_filtered'] = __e['cpus'].filter(entry => entry.value >= 3)`	Filter the `cpus` array inside the event, only keep values greater than or equal to `3` and place in a new field `cpu_filtered`
Reduce	`__e['cpus_reduce'] = __e['cpus'].reduce((accumulator, entry) => accumulator + entry.value, 0)`	Summarize data across an array, with a returned accumulator value (`cpus_reduce: 11.8`)
Some	`__e['cpus_some'] = __e['cpus'].some(entry => entry.value >= 3)`	`cpus_some` set to true because there is at least one object with a value greater than or equal to `3`
Every	`__e['cpus_every'] = __e['cpus'].every(entry => entry.value >= 10)`	`cpus_every` is false, because not all values in the event are greater than or equal to `10`

Function Examples (cont.)

DESCRIPTION	EXPRESSION	NOTES
Transform a Specific Field	`__e['cpus'] = __e['cpus'].map(entry => Object.assign(entry, {'name': entry.name.toLowerCase()}))`	Each cpus member will have its name field transformed to lowercase.
Debugging	``debug("this is the event " + `${JSON.stringify(__e)}`);``	Adds message `this is the event` to events viewed in the Preview Log. Regular logs will also show this message if the function log level is set to `debug`.

Useful JS methods:

String	`.startsWith(), .endsWith(), .trim(), .trimEnd(), .trimStart(), .substring(), .split(), .indexOf(), .length,` etc.
Number	`.isInteger(), .toFixed(), .parseFloat(), .toString(),` etc.
Math	`Math.E, Math.LN10, Math.abs(), Math.sin(), Math.log(), Math.max(), Math.pow(), Math.sqrt(),` etc.

Cribl Expressions:

Decode	`C.Decode.base64(), C.Decode.gzip(), C.Decode.hex(), C.Decode.uri()`
Encode	`C.Encode.base64(), C.Encode.gzip(), C.Encode.hex(), C.Encode.uri()`
Inline Lookup	`C.Lookup(), C.LookupCIDR(), C.LookupRegex()`
Mask	`C.Mask.isCC(), C.Mask.luhn(), C.Mask.md5(), C.Mask.sha1(), C.Mask.random(),` etc.
Net	`C.Net.cidrMatch(), C.Net.ipv6Normalize(), C.Net.isPrivate()`
Text	`C.Text.entropy(), C.Text.hashCode(), C.Text.isASCII(), C.Text.isUTF8(), C.Text.relativeEntropy()`
Time	`C.Time.strftime(), C.Time.strptime(), C.Time.timestampFinder()`
Others	`C.vars, C.env, C.Misc.xxx(), C.version` etc.