Synapse Bootcamp

Module 8
Intro to Storm

v0.4 - May 2024

Objectives

- Understand the basic elements used in Storm queries
- Understand the key **operating concepts** behind Storm's behavior
- Know how to **lift** nodes using Storm
  - Using form / property names
  - Using form / property values
  - Using extended Storm operators

Why Storm?

- **Storm** is the query language used to interact with the data in Synapse
  - A "data language"
  - Designed to be concise, intuitive
- Using Storm can be as simple (or as powerful) as you like
- Storm allows you to "learn as you go"
  - Start simple
  - Learn additional syntax as needed

The Synapse UI simplifies many analysis tasks and often runs Storm "under the hood". However, Storm gives you the power and flexibility to tell Synapse **exactly** what you want. Storm can often get you an answer faster and more efficiently than the UI.

Storm Query Components

Component	Example	Description
Form	`inet:ipv4`	The objects to view / work with
Property (full or relative)	`inet:ipv4:asn` `:asn`	

Comparison Operator	`inet:ipv4 = 8.8.8.8`
	`file:bytes:size >= 102400`
	
	`inet:whois:rec:created @= (2023,2024)`
	`ou:org:name ^= ministry`
		Used with values; how the value should be compared / evaluated

Value	`inet:ipv4 = 8.8.8.8` `ou:org:name ^= ministry`	Value used to select object(s)
Tag	`#cno.mal` `#cno.threat.t13`	Annotations placed on nodes

Storm Query Components

Component	Example	Description

Operation (lift, filter, pivot, traverse...)	`inet:fqdn=vertex.link`
	`inet:ipv4#rep.eset +:asn=16276`
	`inet:fqdn=woot.com -> inet:dns:a`
	`media:news -(refs)> hash:*`
		How Synapse should act on the data
		May include a symbol representing the operation to perform

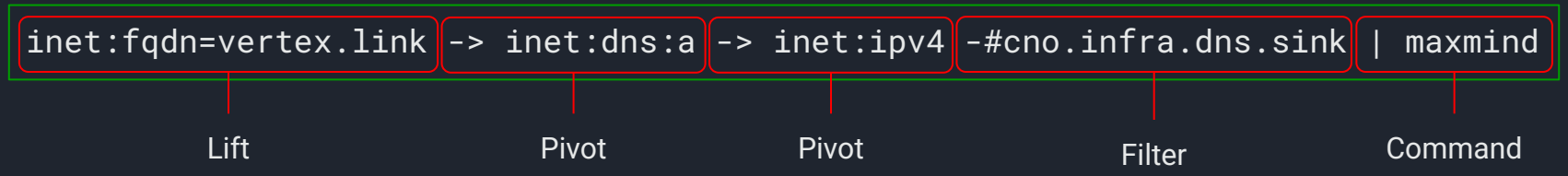
Command	`file:bytes | max :mime:pe:compiled`
	`risk:threat | limit 10`
	`inet:ipv4=123.120.102.48 | maxmind`
		Action or function to perform on the data

Storm Operations

Operation	Meaning	Common Storm Operator	UI Equivalent
Lift	Select data (nodes) from Synapse	Query bar - Storm	Query bar - Lookup / Text Search `query` and copy menu options
Pivot	Move between nodes that share the same **property value**	-> or <- *	Explore button `pivot` menu option
Traverse	Move between nodes that are linked by an **edge**	-(*)> or <(*)-	Explore button
Filter	Include / exclude a subset of nodes	+ or -	n/a (column filters; `query` / `select` menu options)
Run	Execute a Storm command	| <command>	Node Action
Modify / Edit	Modify or delete properties Add or remove tags Add nodes	[ ] or [( )]	Inline property edit; delete menu option Add / remove tags menu options Lookup or Auto Add / Add Node

Storm and Operation Chaining

- Operations are "building blocks" that you **chain** together



Lifting Data with Storm

Lifts in Storm

- **Select** one or more objects (nodes) from the Synapse data store
  - No "show me all the data" button
- Most lifts in Storm use one of the following:
  - **Form**
  - **Form** and **property**
  - **Form / property** and **value**
  - **Tag**

Lift by Property Value

- Equals (=) is the simplest comparison operator
  - Specific node
  - All nodes with a specific value

Kind of Lift	Example	Question
By primary property value	`inet:fqdn = vertex.link`	Show me the FQDN 'vertex.link'
By secondary property value	`inet:ipv4:asn = 9009`	Show me all the IPv4s on AS 9009
By secondary property value	`ou:org:name = 'the vertex project'`	Show me the organization(s) named 'the vertex project'

Lift by Tag

- Nodes that have a particular tag
  - All nodes
  - Specific nodes

Kind of Lift	Example	Question
By tag	`#rep.mandiant.apt1`	Show me everything Mandiant associates with APT1
Form by tag	`inet:fqdn#rep.mandiant.apt1`	Show me the FQDNs Mandiant associates with APT1

Lift by Form or Property

- All nodes of a particular kind
- All nodes that have a particular property

Kind of Lift	Example	Question
By form	`inet:ipv4`	Show me all the IPv4s
By property (secondary)	`inet:ipv4:asn`	Show me the IPv4s that have an Autonomous System number
By property (extended)	`file:bytes:_virustotal:reputation`	Show me the files that have a VirusTotal reputation score
By property (universal)	`.created`	Show me all the nodes in Synapse
Form by universal property	`inet:dns:a.seen`	Show me all the DNS A records that have a `.seen` property

Lift Demo - Basic Lifts

Additional Comparison Operators

Additional Comparison Operators

Symbol(s)	Type of Operator	Example
`=, >, <, >=, <=`	Standard / Mathematical	`file:bytes:mime:pe:compiled >= 20130101`
`^=`	By prefix	`ou:org:name ^= ministry`
`~=`	By regular expression	`ou:org:alias ~= edu`
`@=`	By time / interval	`inet:dns:a.seen @= (20220121, now)`
`*[<operator> ]`	Arrays	`crypto:x509:cert:identities:fqdns*[ ~=gov ]`

Lift Demo - Comparison Operators

Specialized Lifts

Specialized Lifts

- Lift forms by **wildcard**
  - Use the wildcard (*) to partially match form names
- Lift by **interface**
  - Specialized data model element
  - Defines set of properties that are copied to other forms
  - Lift all forms that use the interface
  - Lift all forms with a shared interface property / property value

Lift Demo - Specialized Lifts

Synapse UI and Storm

Synapse UI (Lookup / Text Search Mode)	Storm (Storm Mode)
Lift common IOCs Search strings and try to find what you need	Directly lift **any** object in the data store
Use a subset of simple lifts	Lift using additional operators (mathematical, extended)
Explore to find desired data	Lift exactly what you need

Summary

- **Storm** is Synapse's native query language
- Storm queries use:
  - **Data model** objects (forms, nodes, properties, tags)
  - **Operations** (lift, pivot, filter...)
- Operations are **chained** together to build longer queries
  - Storm functions as a **pipeline** from left to right
- A **lift** is the most basic operation in Storm
  - **Simple** lifts match specific forms, property values, or tags
  - Can also lift using **mathematical** operators (>, <=, etc.)
  - Storm-specific **extended** operators for custom lifts (by prefix, by time interval, etc.)