SPECTEROPS

The Dog Ate My Homework…

(re)Building a PowerShell Module for the New BloodHound

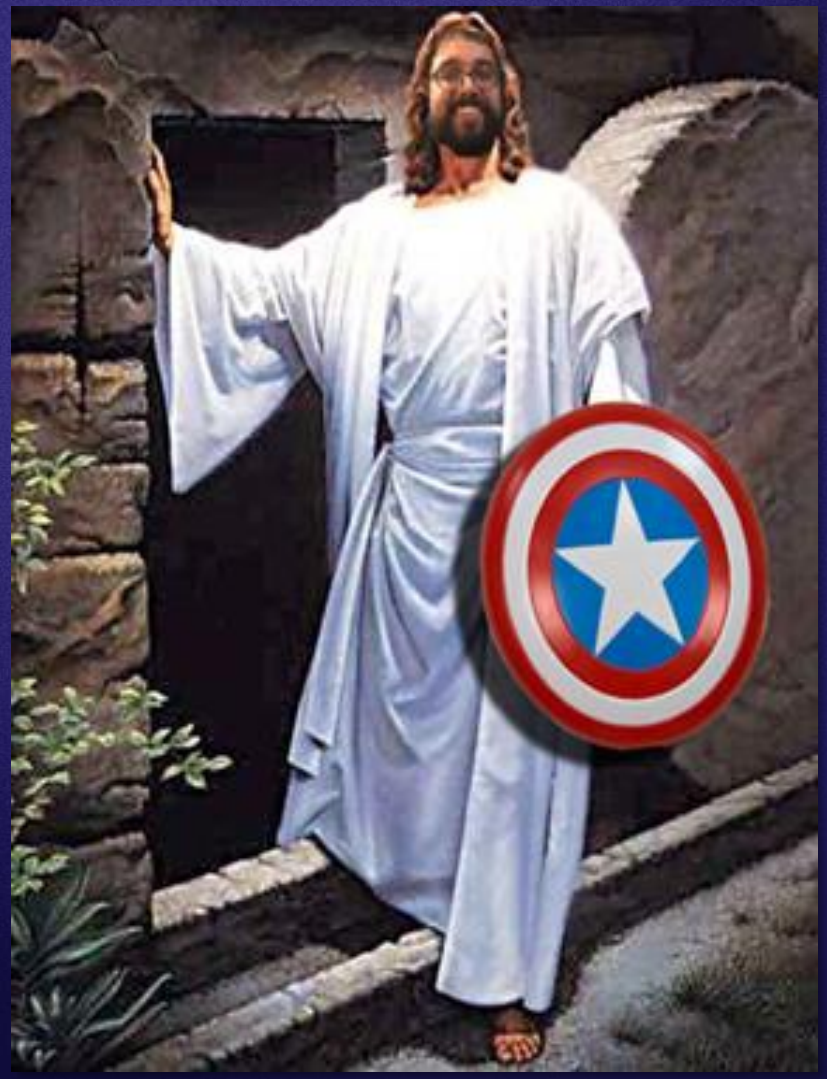
SadProcessor
SpecterOps

whoami

whoami

Some say

I love the Captain…



whoami

Some say

I dream in Graphs…

whoami

Others say

I'm just a PowerShell Bad Boy…

whoami

I can
neither confirm
nor deny
any of these
statements…

whoami

- SadProcessor – Walter Legowski
- Born FR / Home NL / Father x3
- ERNW / FalconForce / SpecterOps
- PowerShell all the Things!!
- Dog Whisperer Handbook
- CypherDog / WatchDog / ZipHound
  BHQlib / FalconHound

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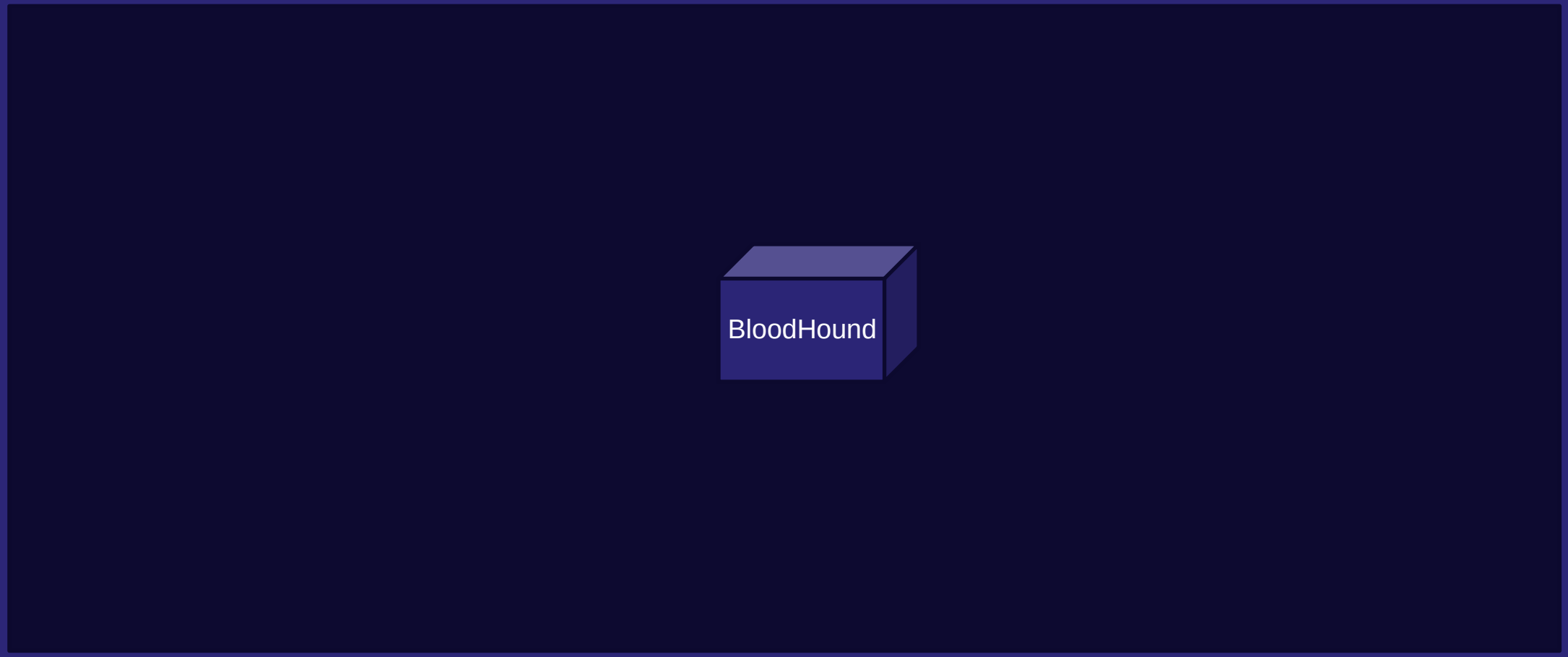
- PowerShell BloodHound Operator

Agenda

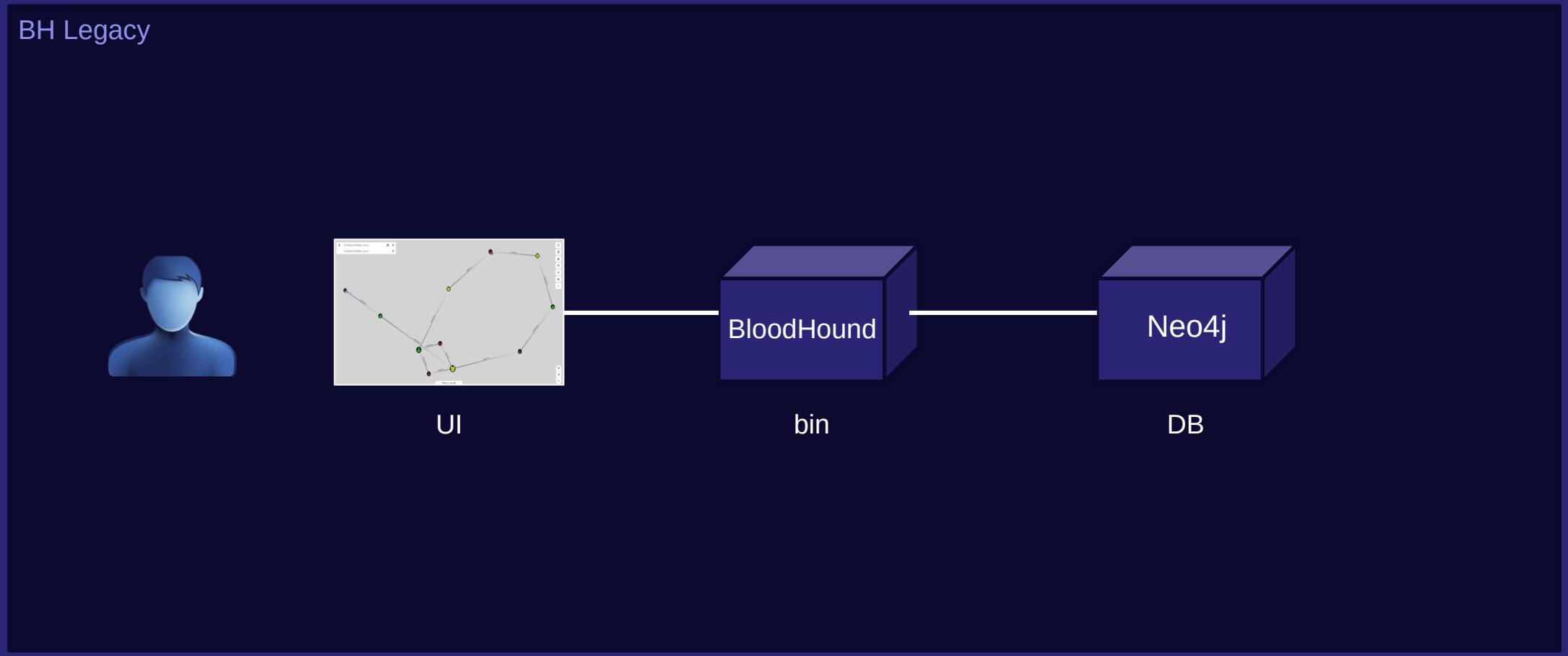
- Intro
- Old BloodHound vs. New BloodHound
- New BloodHound REST API
- PowerShell BloodHound Operator
- What Next…
- Q&A

Old BloodHound vs. New BloodHound

Old vs. New – Components



Old vs. New – Components: Old BloodHound



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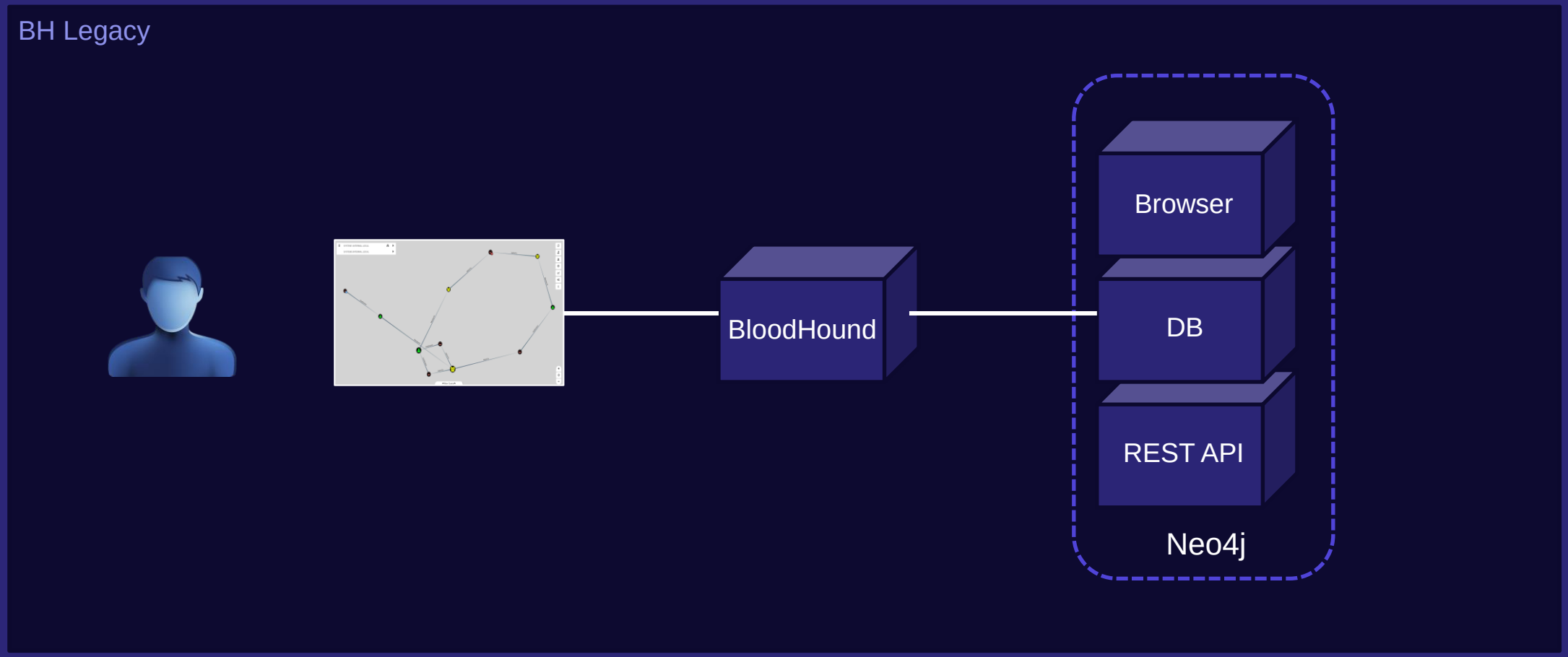

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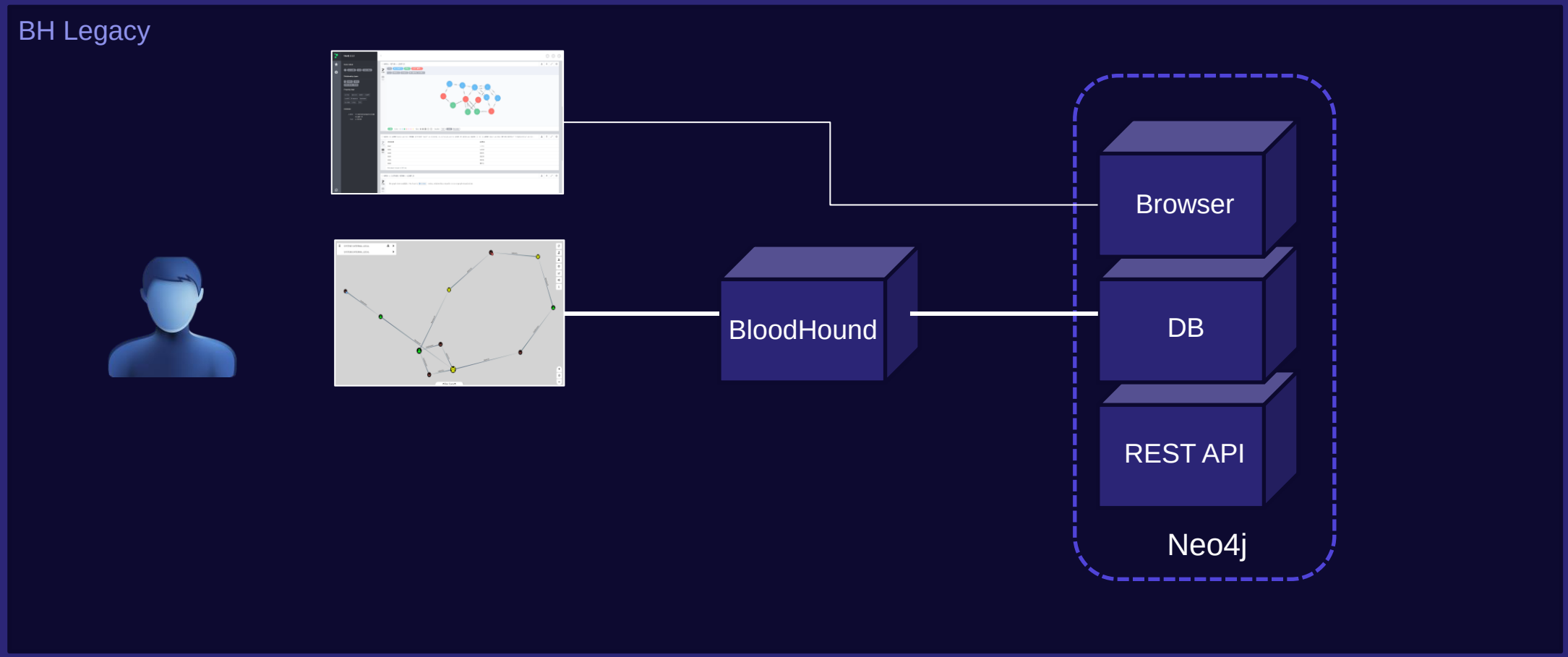

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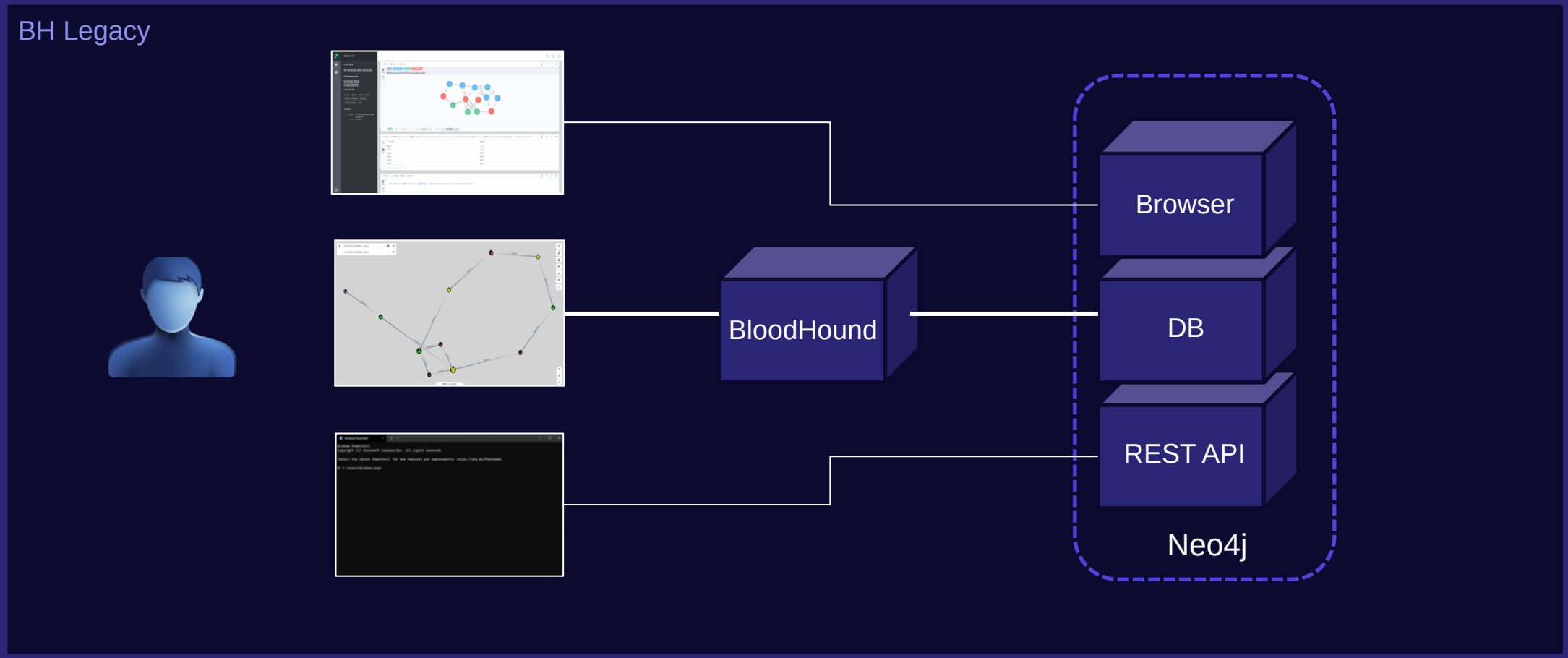

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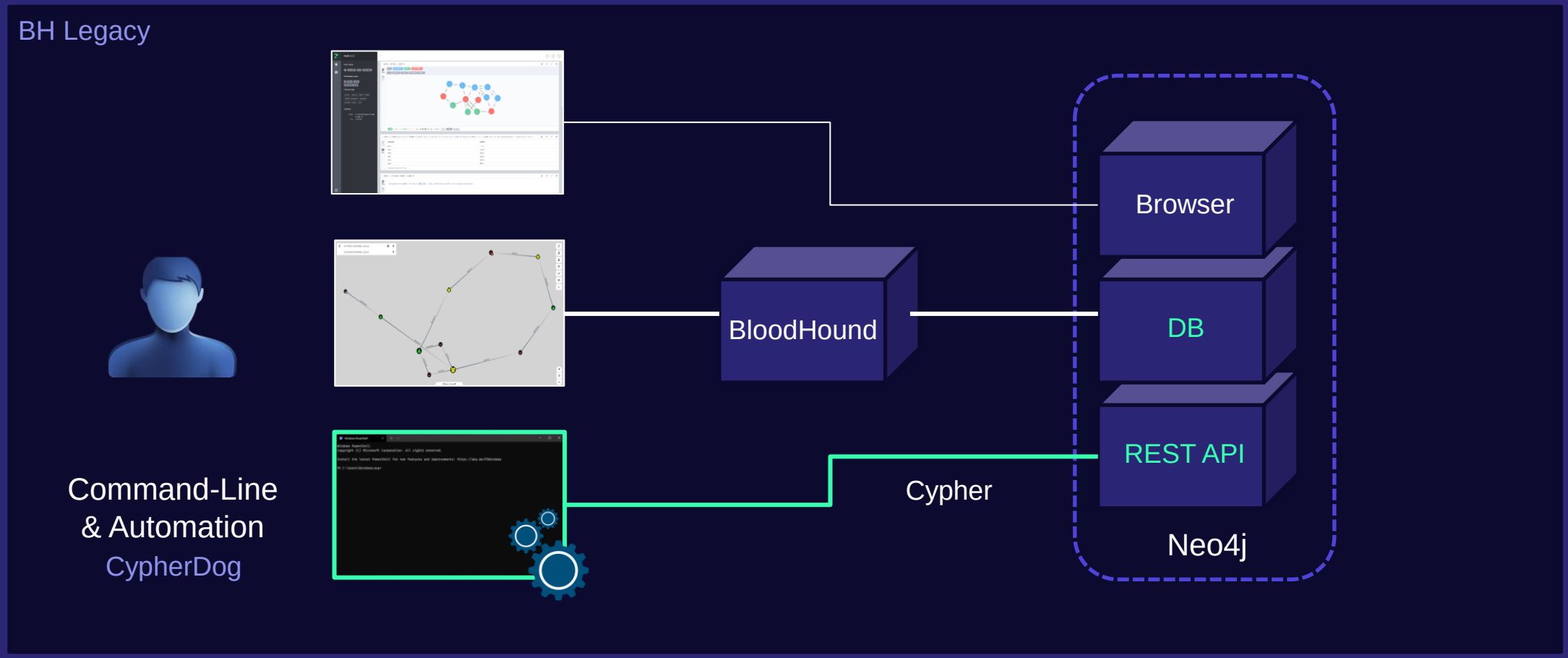
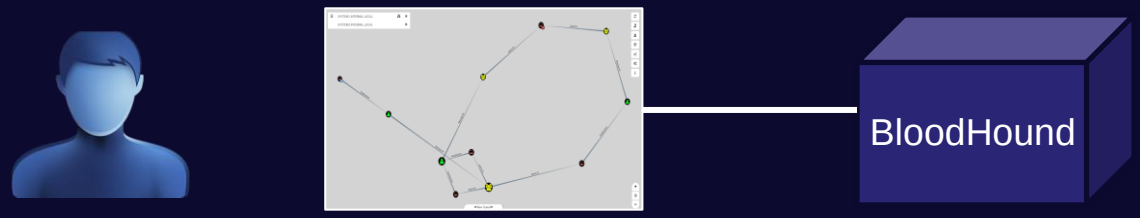


Old vs. New – Components: New BloodHound

BHE / BHCE



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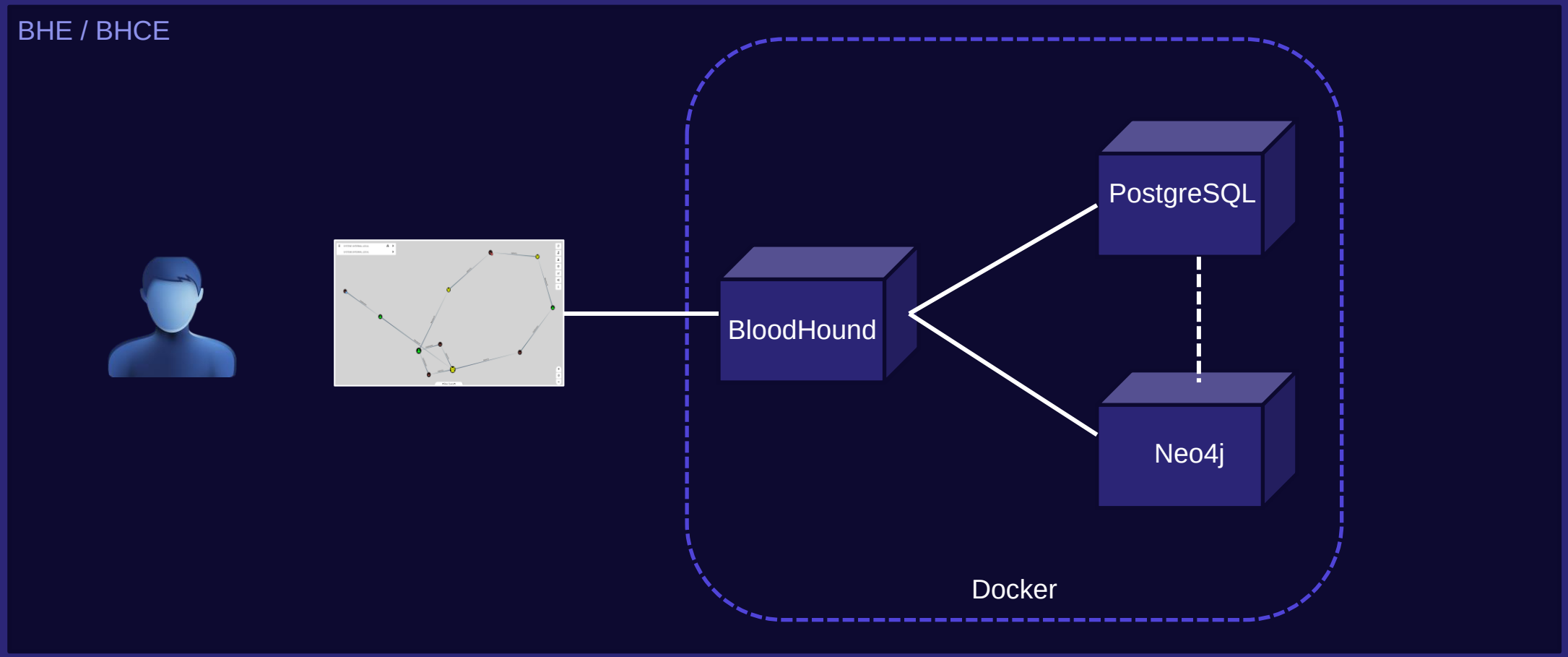

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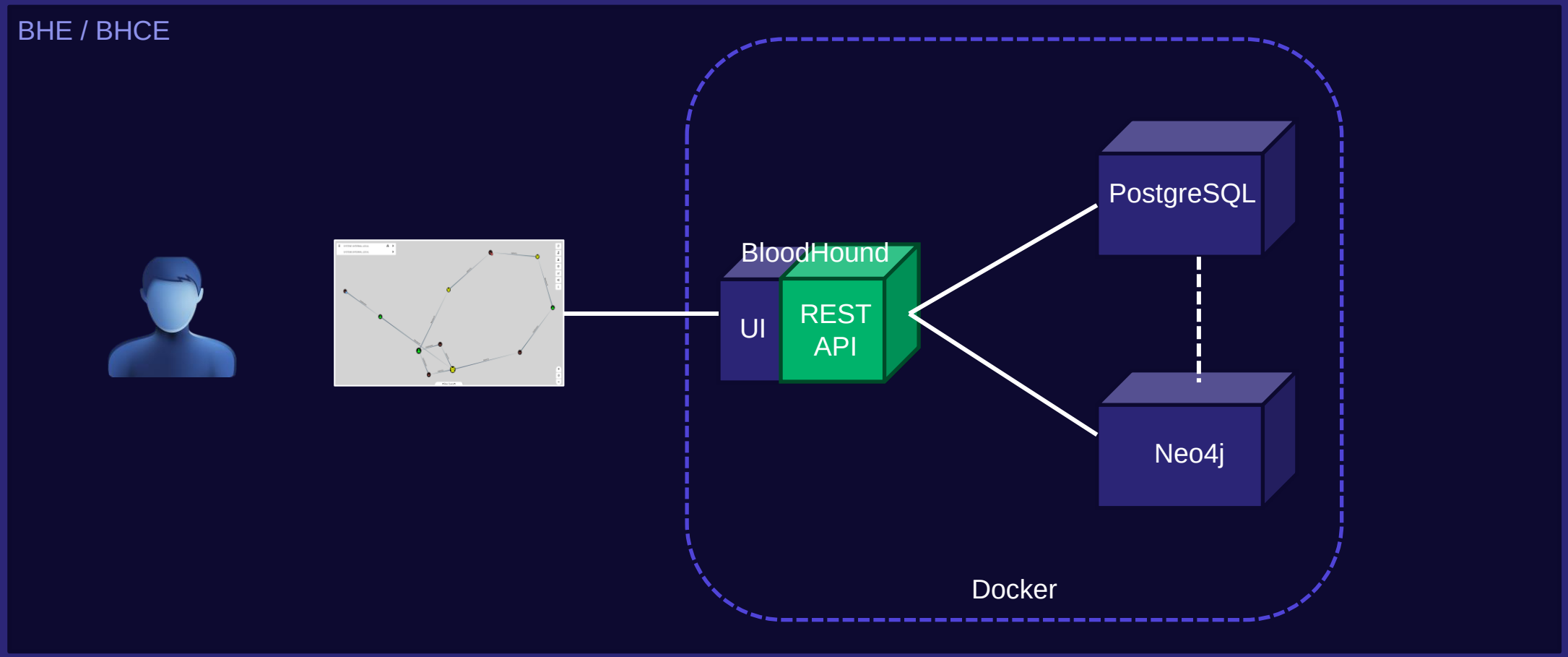

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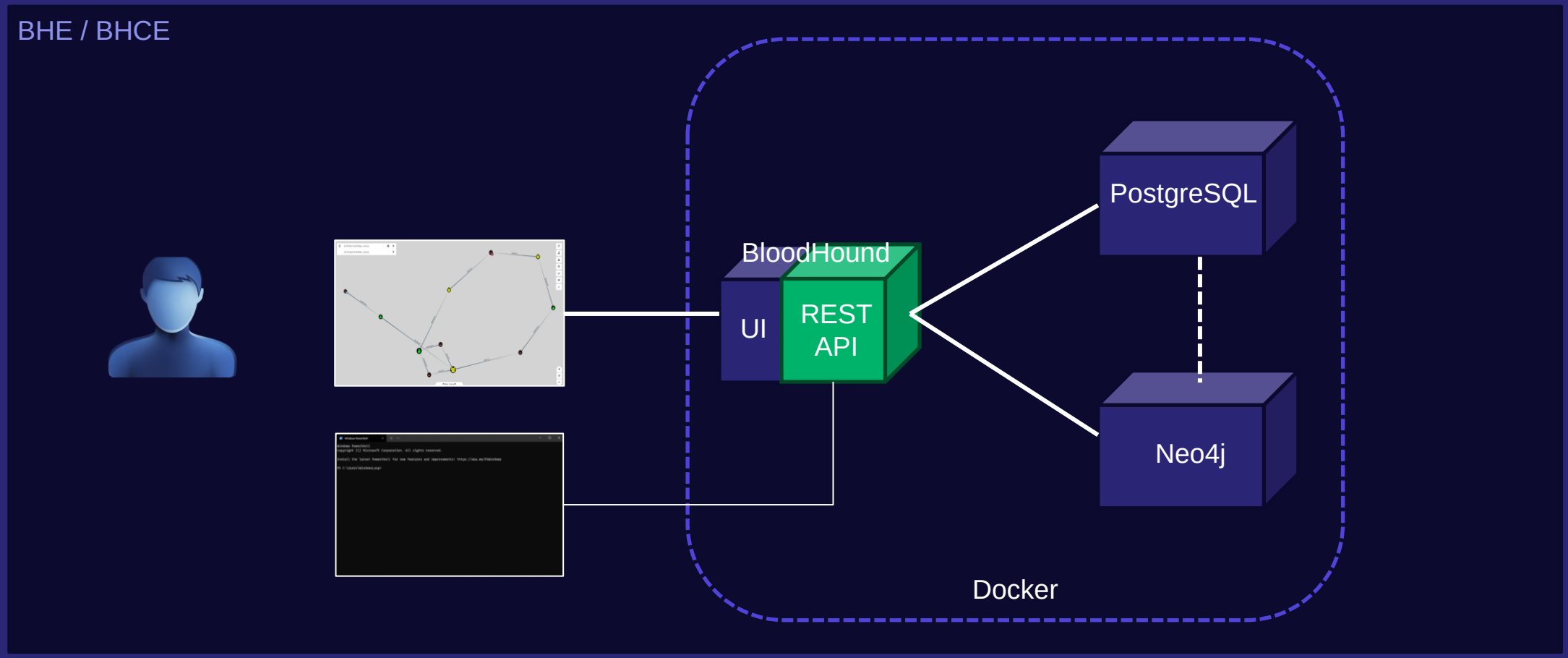

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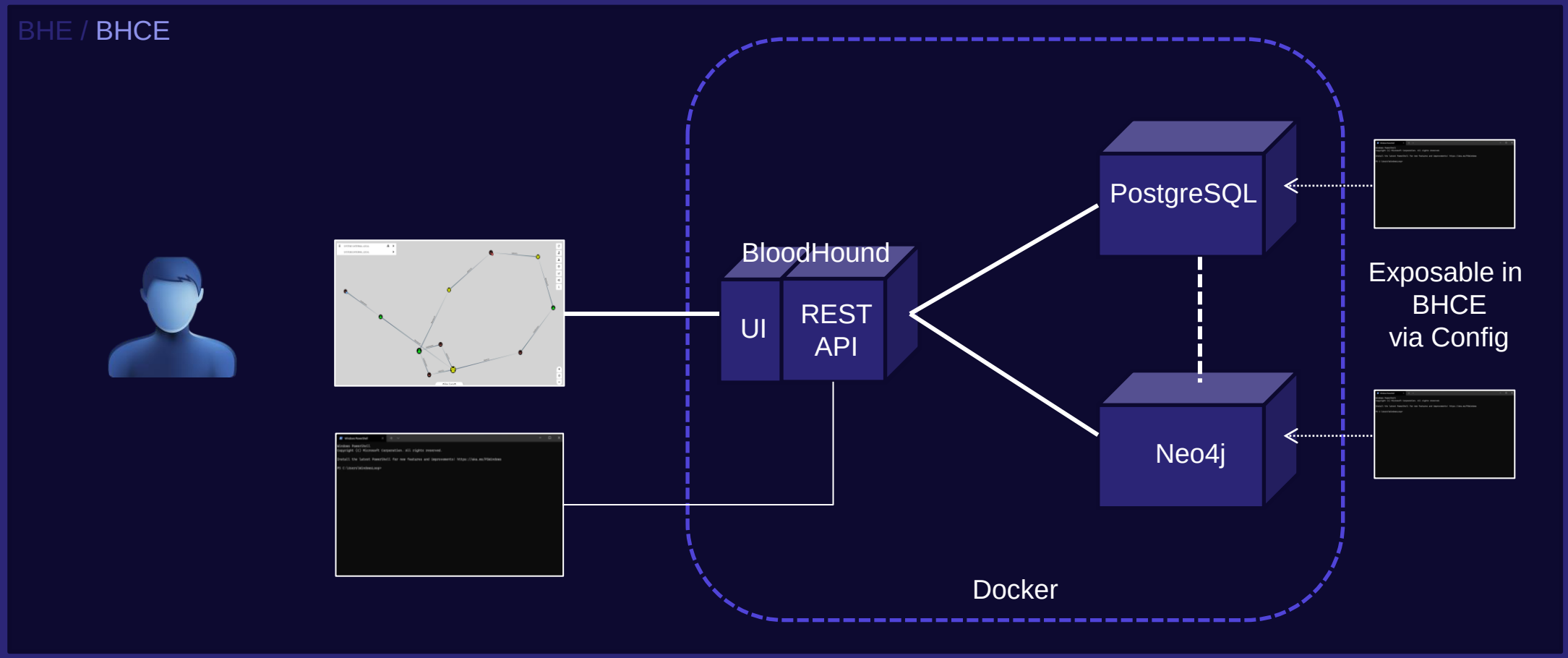

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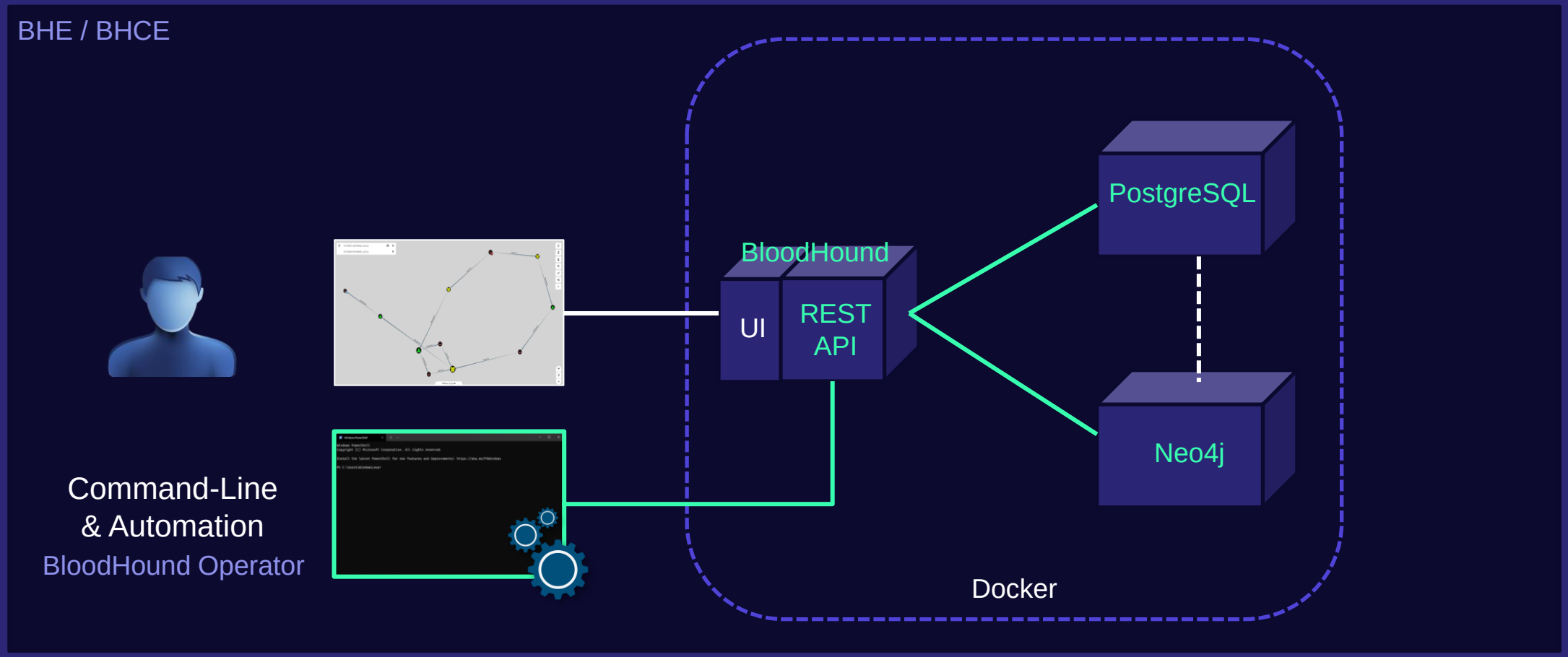

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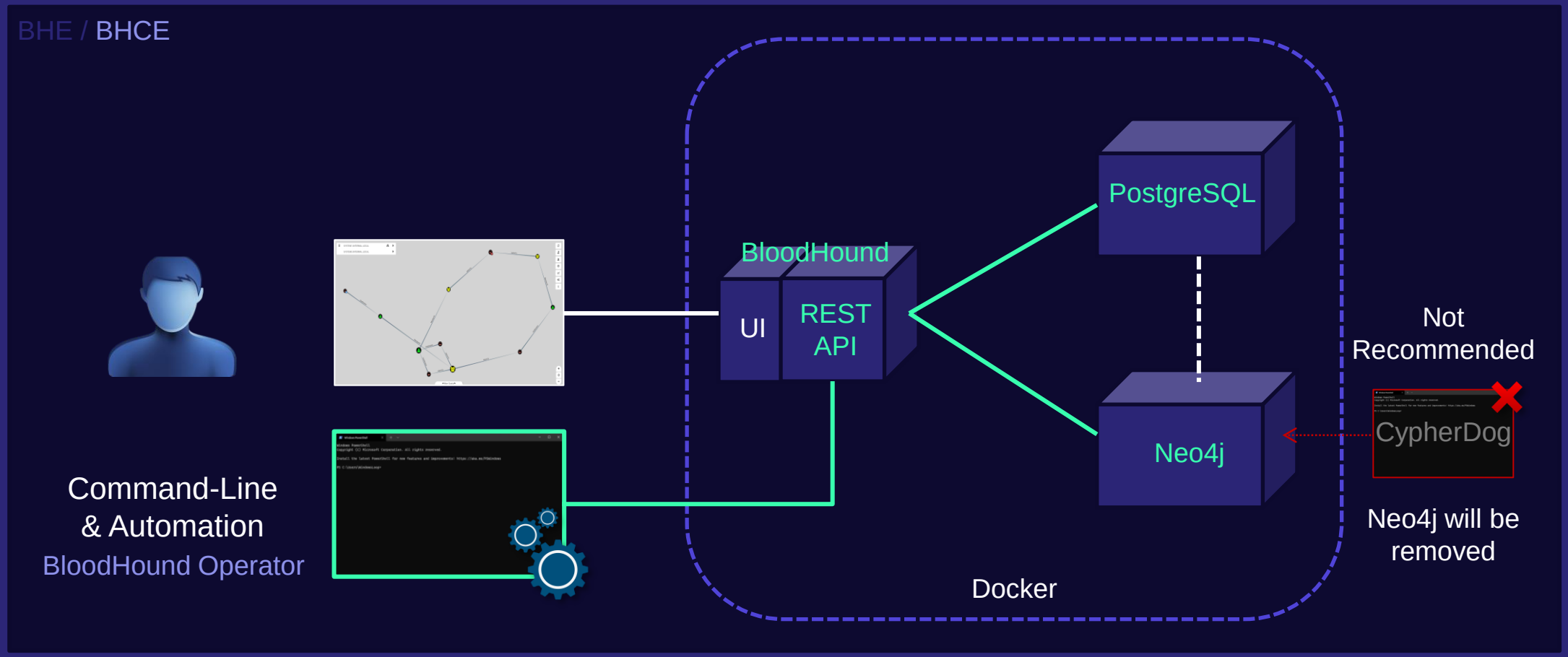

Old vs. New – Feature Comparison

FEATURE	LEGACY	COMMUNITY
Easy Install	✗	✓
User Management	n/a	✓
Secure Authentication	✗	✓
Custom Queries via REST API	✓	✓ *
Data Ingestion via REST API	✗	✓
Other Actions via REST API	✗	✓

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Other Actions via REST API	✗	✓
ADCS Attack Paths	✗	✓


NO TIME TO
OLD
GET IN THE
NEW

New BloodHound REST API

BloodHound REST API – Overview

- Exposes all functionalities of UI
- Follows OpenAPI specs
- Secure Authentication
- Shared BHCE / BHE structure
- Endpoints: BHCE=142 / BHE=195
- Explorable in UI

BloodHound REST API – Roles & Permissions

Authority	Permission	Read-Only	Upload-Only	User	Power User	Admin
App	**ReadAppConfig**	✓		✓	✓	✓
App	**WriteAppConfig**				✓	✓
Auth	**CreateToken**	✓		✓	✓	✓
Auth	**ManageAppConfig**					✓
Auth	**ManageProviders**					✓
Auth	**ManageSelf**	✓		✓	✓	✓
Auth	**ManageUsers**					✓
GraphDB	**Read**	✓		✓	✓	✓
GraphDB	**Write**		✓		✓	✓
Saved_Queries	**Read**			✓	✓	✓
Saved_Queries	**Write**			✓	✓	✓
Clients	Manage				✓	✓
Clients	Read			✓	✓	✓
Clients	Taskings		✓		✓	✓
Collection	ManageJobs				✓	✓
Risks	GenerateReport	✓		✓	✓	✓
Risks	ManageRisks				✓	✓

Access to API endpoints is determined by role and associated permissions in the application

BHE only

BloodHound REST API – Authentication

- Uses TokenID + TokenKey (incl. User Token Lifecycle)
- Each request must be signed
- 3x HMAC SHA256
- Signature = [Hash:(((TokenKey x Operation) x Timestamp) x Body)].ToBase64
- Headers must include TokenID, Signature and Timestamp
- Server validates signature against request

Working with the BloodHound API – BloodHound (bloodhoundenterprise.io)

BloodHound REST API – Authentication

PowerShell

```powershell
# Signature
$Timestamp = [Datetime]::utcnow.tostring('o')
$KeyByte   = [Text.Encoding]::UTF8.GetBytes($TokenKey)
$OpByte    = [Text.Encoding]::UTF8.GetBytes("$Method/$URI")
$DateByte  = [Text.Encoding]::UTF8.GetBytes(-join $Timestamp[0..12])
$BodyByte  = [Text.Encoding]::UTF8.GetBytes("$Body")
$HMAC      = [Security.Cryptography.HMACSHA256]::new($KeyByte).ComputeHash($OpByte)
$HMAC      = [Security.Cryptography.HMACSHA256]::new($HMAC).ComputeHash($DateByte)
$HMAC      = [Security.Cryptography.HMACSHA256]::new($HMAC).ComputeHash($BodyByte)
$Sign      = [Convert]::ToBase64String($HMAC)
```

```powershell
# Headers
$Headers = @{
    Authorization = "BHESignature $TokenID"
    Signature     = $Sign
    RequestDate   = $Timestamp
    }
```

PowerShell BloodHound Operator

BloodHound Operator – Features

- PowerShell Cmdlets for the BloodHound REST API (50+)
  - Verb-BHNoun Syntax / Pipeline Input / Output Objects / Tab-Completion / …
  - All application features are accessible
  - Allows for scripted deployments
  - Allows for full Ingest-Query-Analyze automation (DIY)
  - Experimental: Multiple sessions

BloodHound Operator – Disclaimer

- Still a Work-In-Progress…
- ADCS / BHE endpoints not included yet
- Some things will change = Break
- Provided as Gist for beta testers / No Support (feedback via BH Slack)
- Not an official SpecterOps tool
- Use at your own risks…

¯_(ツ)_/¯

DEMO

BloodHound Operator – Basic Usage

What’s Next ?

ToDo

ToDo

- On my side:
- Add ADCS / BugFix / Docs
- Add BHE functionalities
- Format as proper Module
- Publish to PS Gallery
- Present at PSConfEU

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- Add ADCS / BugFix / Docs
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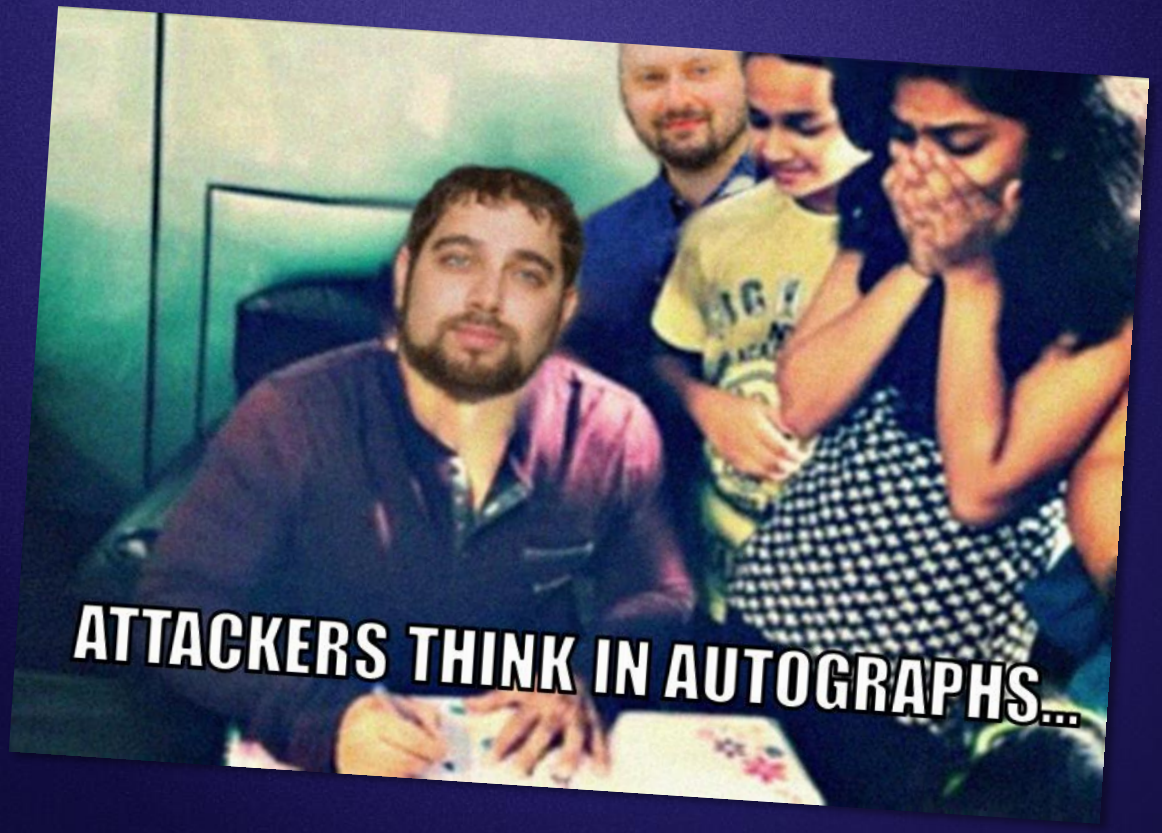
- On your side:
- Download Gist
- Test-drive
- Feedback via BH Slack
- Wait for release
- Automate all the things…

Questions ?

Reminder

CptJesus will be signing autographs in the lobby later this afternoon…

Come and get yours!



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Thank you

Catch me in the lobby if you want to chat…

Enjoy the rest of SO-CON!

SadProcessor

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