Overview

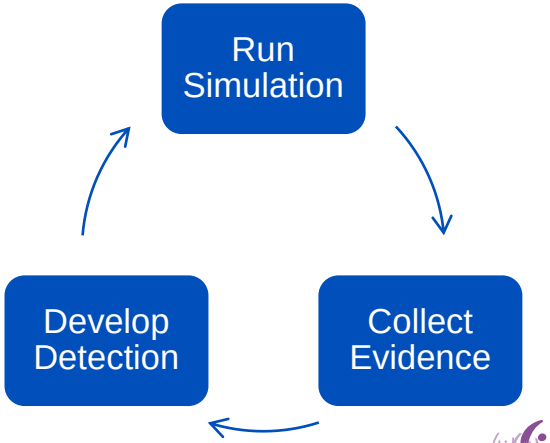
- What is Breach and Attack Simulation (BAS)
- Why Use BAS tools
  - Measure defensive capabilities
- Overview of the MITRE ATT&CK Matrix
  - Compare with Trickbot
- List of Open Source tools
- Overview of the various tools

What is BAS

- Ability to simulate adversarial activities with some degree of automation. [1]
- May be adversary model based, for example the Adversarial Tactics, Techniques & Common Knowledge (ATT&CK™) project. [2]

Why use BAS tools

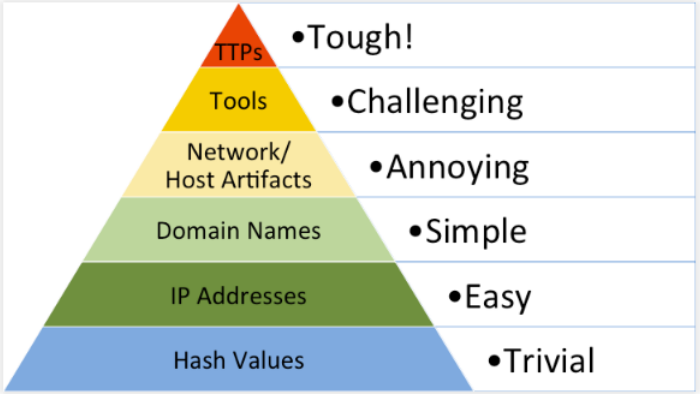
- Measure defensive capabilities;
- Threat hunting and incident response preparedness;
- Gain insights into areas of potential vulnerability;
- Continual simulation testing highlights critical exposures in a network.



Measure defensive capabilities

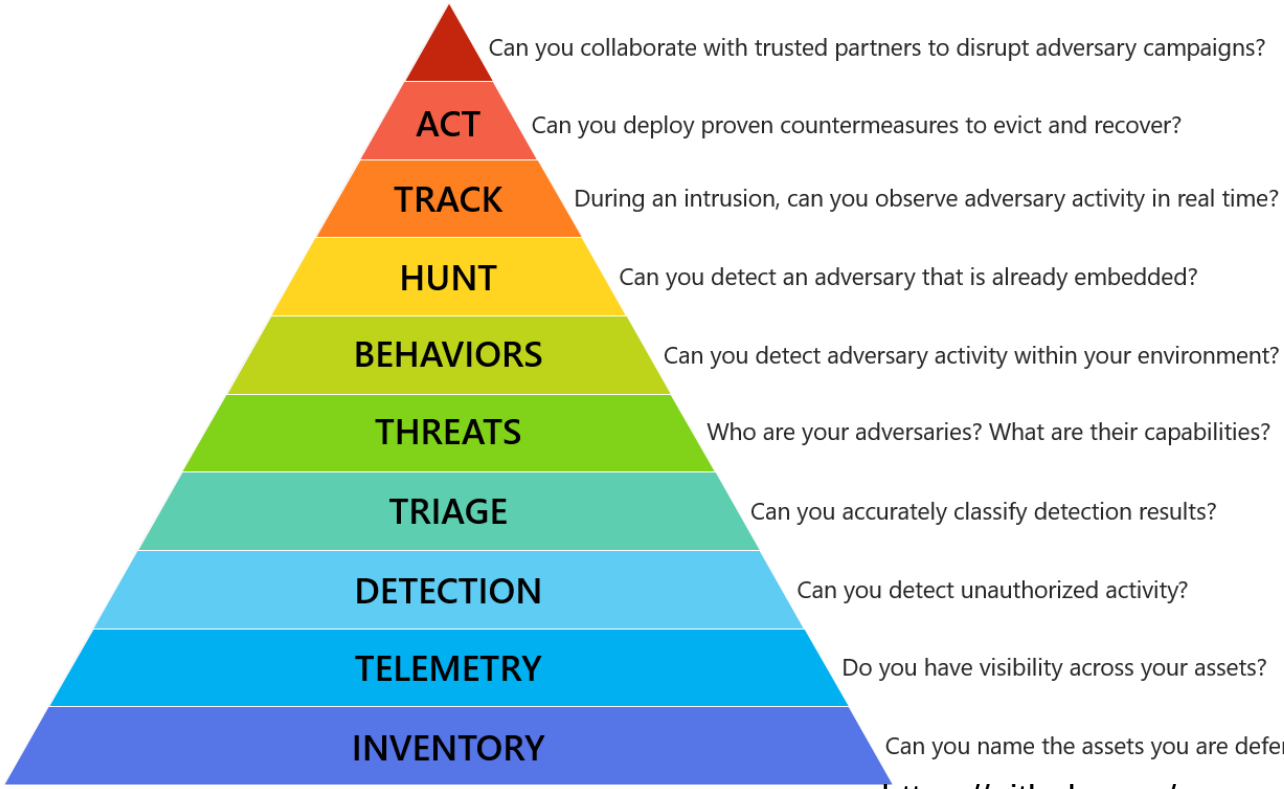
- Do your systems detect these malicious activities:
  - CLI or PowerShell attacks
  - C2 server communications
  - Ransomware
  - Trojans
  - Malicious scripts or executables
  - Man in the Middle attacks
  - Disabling Security Tools (T1089)
  - … and many more

- Can you prove it?



https://detect-respond.blogspot.com/2013/03/the-pyramid-of-pain.html

The Incident Response Hierarchy of Needs



https://github.com/swannman/ircapabilities

ATT&CK Matrix for Enterprise

ATT&CK Matrix for Enterprise

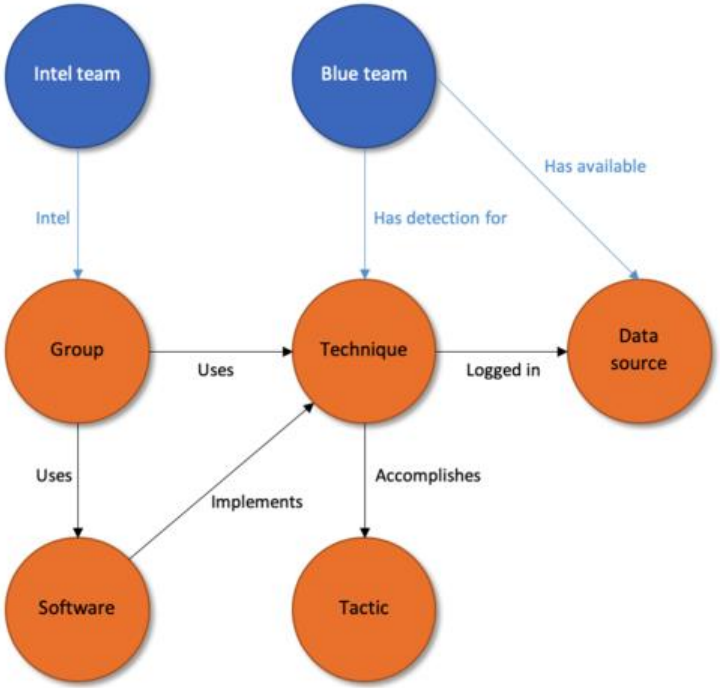
Initial Access	Execution	Persistence	Privilege Escalation	Defense Evasion	Credential Access	Discovery	Lateral Movement	Collection	Exfiltration	Command and Control
Drive-by Compromise	AppleScript	.bash_profile and .bashrc	Access Token Manipulation	Access Token Manipulation	Account Manipulation	Account Discovery	AppleScript	Audio Capture	Automated Exfiltration	Commonly Used Port
Exploit Public-Facing Application	CMSTP	Accessibility Features	Accessibility Features	BITS Jobs	Bash History	Application Window Discovery	Application Deployment Software	Automated Collection	Data Compressed	Communication Through Removable Media
Hardware Additions	Command-Line Interface	Account Manipulation	AppCert DLLs	Binary Padding	Brute Force	Browser Bookmark Discovery	Distributed Component Object Model	Clipboard Data	Data Encrypted	Connection Proxy
Replication Through Removable Media	Compiled HTML File	AppCert DLLs	AppInit DLLs	Bypass User Account Control	Credential Dumping	File and Directory Discovery	Exploitation of Remote Services	Data Staged	Data Transfer Size Limits	Custom Command and Control Protocol
Spearphishing Attachment	Control Panel Items	AppInit DLLs	Application Shimming	CMSTP	Credentials in Files	Network Service Scanning	Logon Scripts	Data from Information Repositories	Exfiltration Over Alternative Protocol	Custom Cryptographic Protocol
Spearphishing Link	Dynamic Data Exchange	Application Shimming	Bypass User Account Control	Clear Command History	Credentials in Registry	Network Share Discovery	Pass the Hash	Data from Local System	Exfiltration Over Command and Control Channel	Data Encoding
Spearphishing via Service	Execution through API	Authentication Package	DLL Search Order Hijacking	Code Signing	Exploitation for Credential Access	Network Sniffing	Pass the Ticket	Data from Network Shared Drive	Exfiltration Over Other Network Medium	Data Obfuscation
Supply Chain Compromise	Execution through Module Load	BITS Jobs	Dylib Hijacking	Compiled HTML File	Forced Authentication	Password Policy Discovery	Remote Desktop Protocol	Data from Removable Media	Exfiltration Over Physical Medium	Domain Fronting
Trusted Relationship	Exploitation for Client Execution	Bootkit	Exploitation for Privilege Escalation	Component Firmware	Hooking	Peripheral Device Discovery	Remote File Copy	Email Collection	Scheduled Transfer	Fallback Channels
Valid Accounts	Graphical User Interface	Browser Extensions	Extra Window Memory Injection	Component Object Model Hijacking	Input Capture	Permission Groups Discovery	Remote Services	Input Capture		Multi-Stage Channels

https://attack.mitre.org – accessed 12th Nov 2018

ATT&CK Matrix for Enterprise

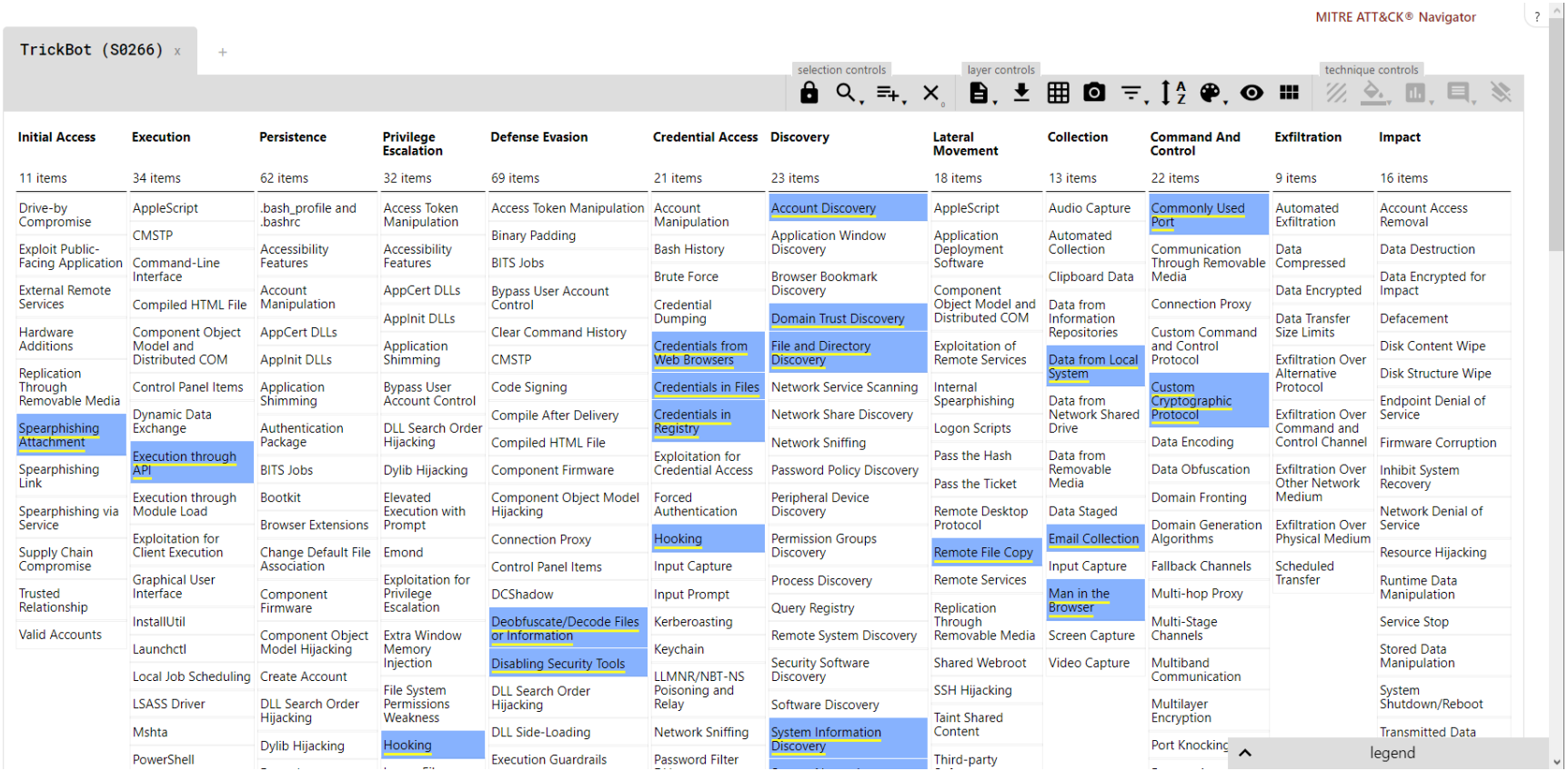
- Adversarial Tactics, Techniques, and Common Knowledge (ATT&CK);
- MITRE started this project in 2013 to document common tactics, techniques, and procedures (TTPs) an adversary takes while operating within an enterprise network;
- Help organizations understand the stages of attack events;
- Stage of event across top axis and the mechanism for that stage down the column.

ATT&CK Matrix for Enterprise



https://www.mbsecure.nl/blog/2019/5/dettact-mapping-your-blue-team-to-mitre-attack

Trickbot mapped to ATT&CK Matrix



https://attack.mitre.org/software/S0266/ - accessed 10th Jun 2020

Open source tools

- Guardicore's Infection Monkey
  - http://infectionmonkey.com
- Uber's Metta -
  - https://github.com/uber-common/metta
- AlphaSOC's FlightSIM
  - https://github.com/alphasoc/flightsim
- Synex Caldera
  - https://github.com/mitre/caldera
- Blue team training toolkit (BT3)
  - https://www.encripto.no/en/downloads-2/tools/
- Atomic Red Team
  - https://atomicredteam.io
- Redhunt OS
  - https://github.com/redhuntlabs/RedHunt-OS

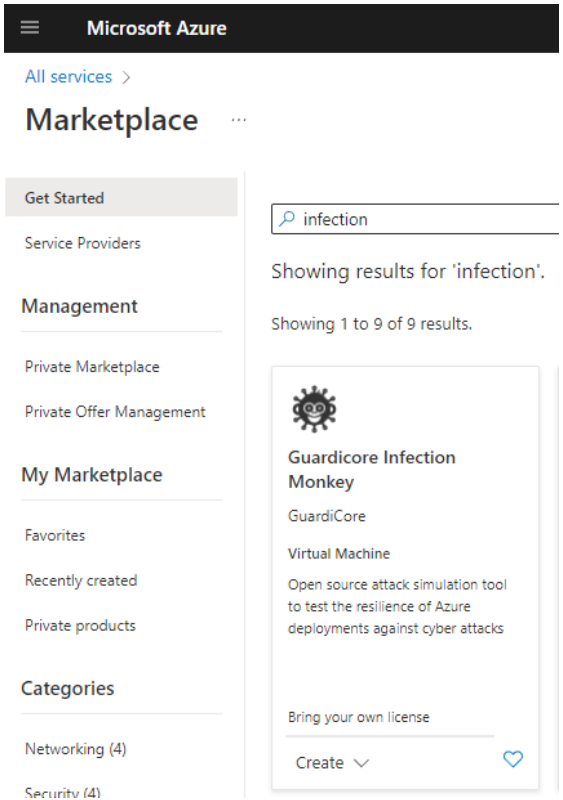
* This list is not all of the open source projects and is only limited by the authors knowledge

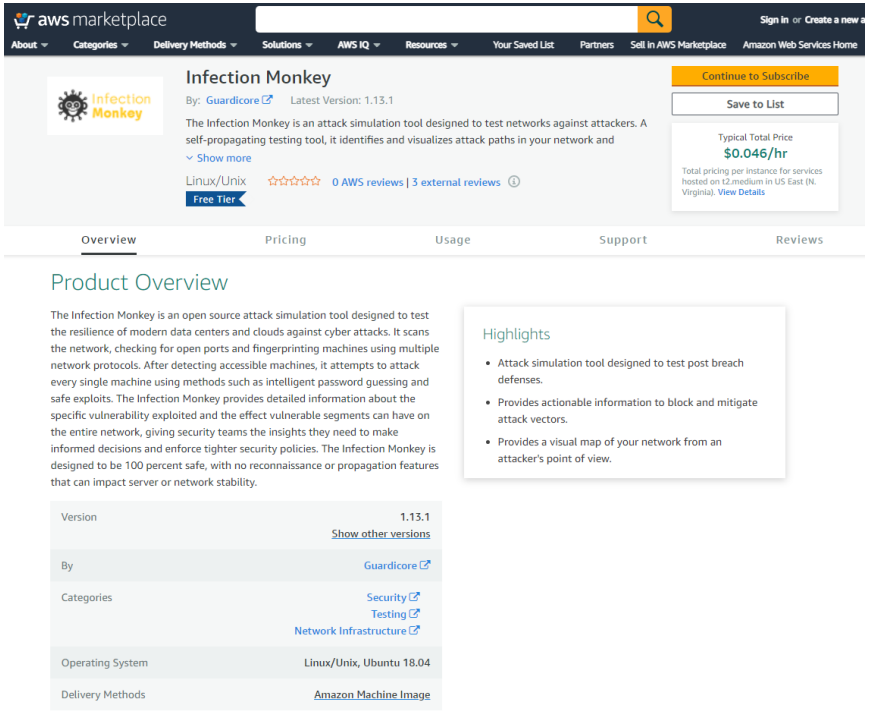
Infection Monkey

- Available for download, and as a virtual instance on Azure and Amazon marketplace.
- Designed to test the resilience of modern data centers and clouds against cyber attacks.
- Developed by GuardiCore Labs under the GPL v3 open source license.
- Comprised of two parts:
  - Monkey – A tool which infects other machines and propagates to them
  - Monkey Island – A Command & Control server with a dedicated UI to visualize the Chaos Monkey's progress

https://github.com/guardicore/monkey

Infection Monkey





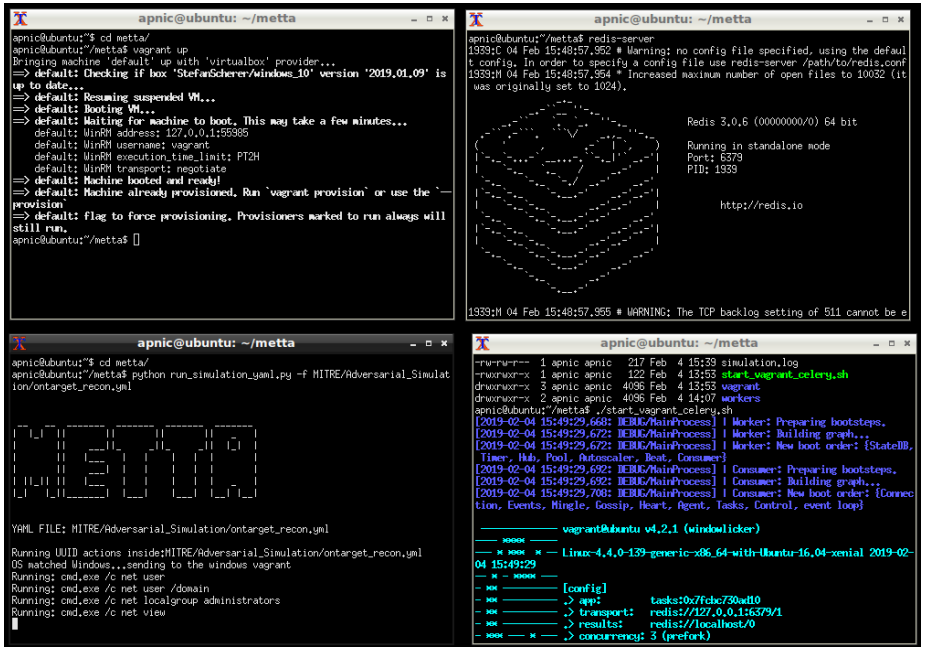
Metta

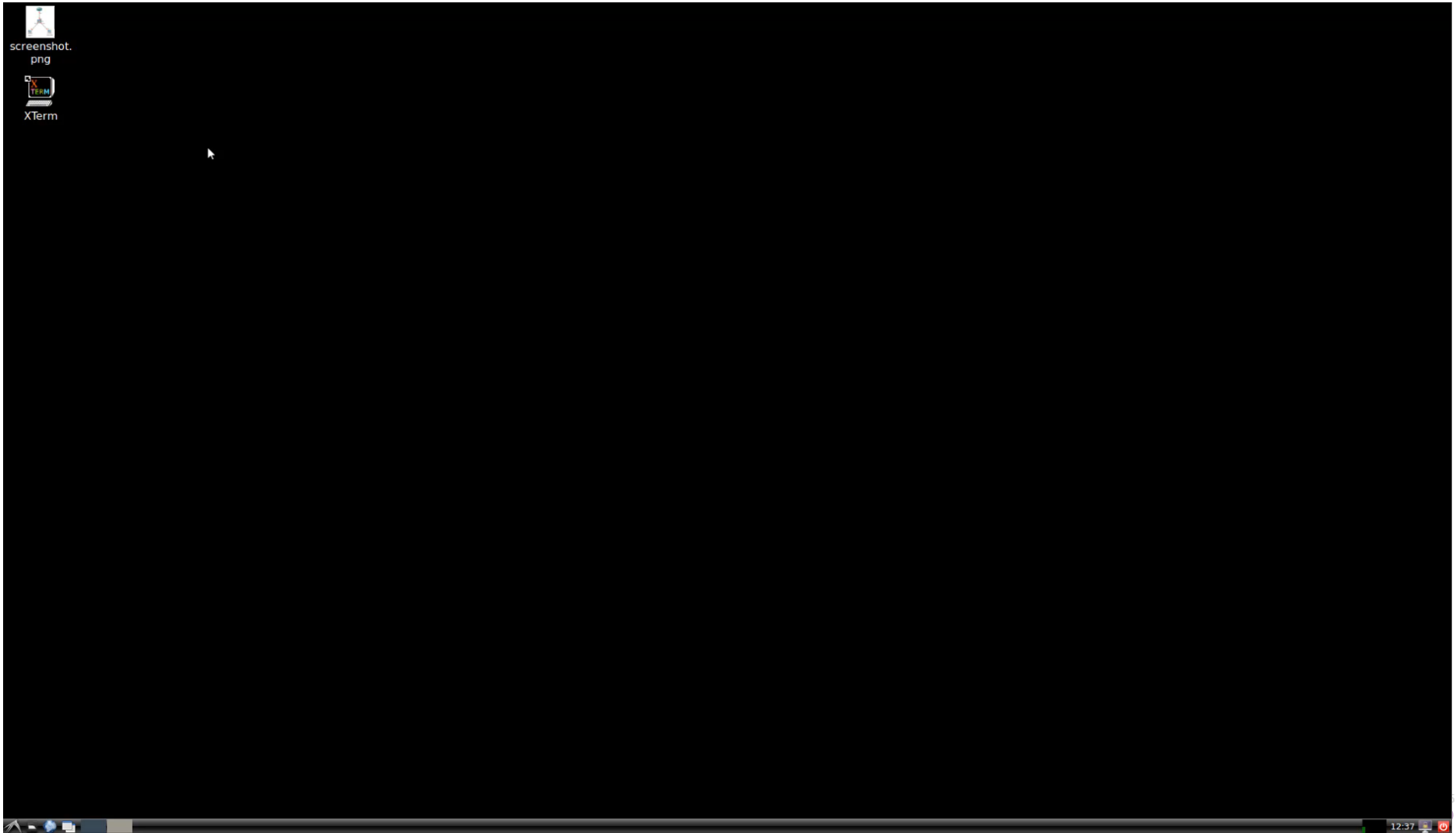
- An information security preparedness tool;
- Uses Redis/Celery, python, and vagrant to do adversarial simulation;
- Allows you to test (mostly) your host based instrumentation;
- Depending on how vagrant is setup. It may test network based detection and controls;
- Parses YAML files with actions and uses celery to queue these actions up and run them one at a time without interaction.

https://github.com/uber-common/metta

Metta

- What protection is in place to detect this?
- Event logs?
  - 4661
  - 4662
  - 4663
- Command line process auditing?




screenshot.
png
XTerm
12:37

FlightSim

- Lightweight utility used to generate malicious network traffic
- Performs tests to simulate
  - Domain Name Service (DNS) tunneling,
  - Domain generation algorithms (DGA) traffic,
    - requests to known active C2 destinations.
  - and other suspicious traffic patterns.
- Help security teams to evaluate security controls and network visibility.

```
$ flightsim run dga

AlphaSOC Network Flight Simulator™ (https://github.com/alphasoc/flightsim)
The IP address of the network interface is 172.31.84.103
The current time is 10-Jan-18 09:30:28

Time      Module   Description
-------------------------------------------------------------------------------
09:30:28  dga      Starting
09:30:28  dga      Generating list of DGA domains
09:30:30  dga      Resolving rdumomx.xyz
09:30:31  dga      Resolving rdumomx.biz
09:30:31  dga      Resolving rdumomx.top
09:30:32  dga      Resolving qtovmrn.xyz
09:30:32  dga      Resolving qtovmrn.biz
09:30:33  dga      Resolving qtovmrn.top
09:30:33  dga      Resolving pbuzkkk.xyz
09:30:34  dga      Resolving pbuzkkk.biz
09:30:34  dga      Resolving pbuzkkk.top
09:30:35  dga      Resolving wfoheoz.xyz
09:30:35  dga      Resolving wfoheoz.biz
09:30:36  dga      Resolving wfoheoz.top
09:30:36  dga      Resolving lhecftf.xyz
09:30:37  dga      Resolving lhecftf.biz
09:30:37  dga      Resolving lhecftf.top
09:30:38  dga      Finished

All done! Check your SIEM for alerts using the timestamps and details above.
```

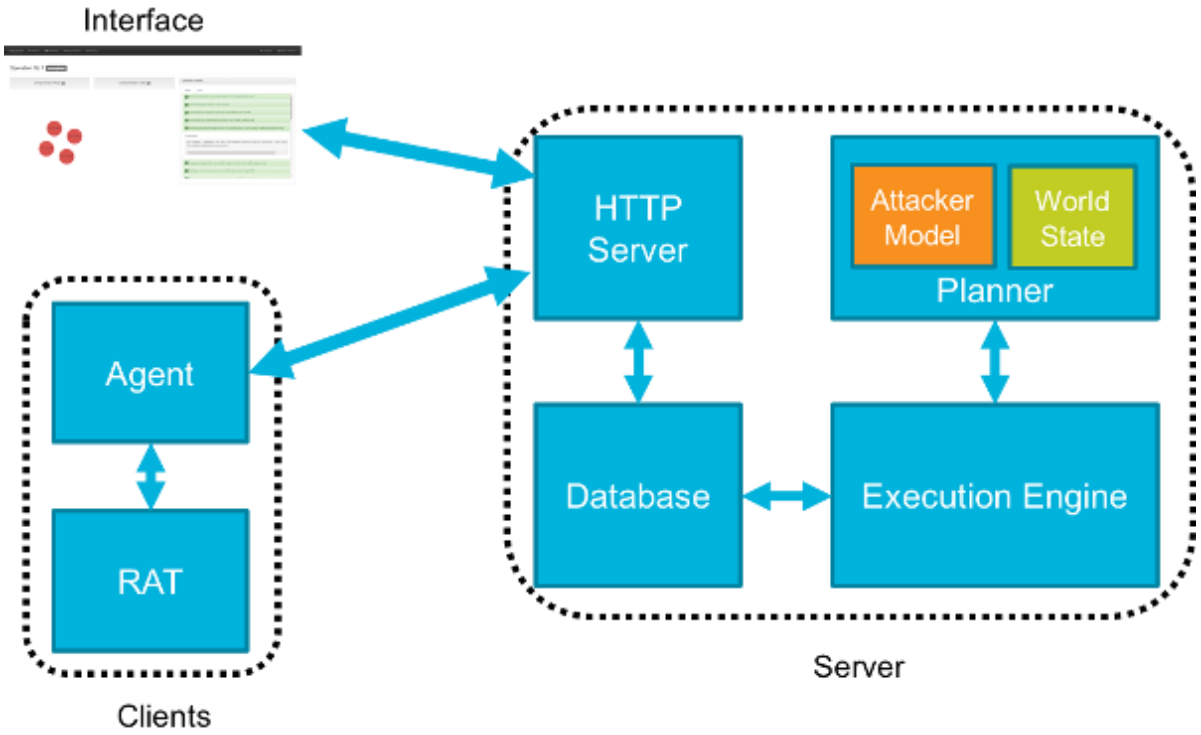
https://github.com/alphasoc/flightsim

Caldera

- CALDERA is a MITRE research project;
- An automated adversary emulation system;
- Performs post-compromise adversarial behavior within Windows Enterprise networks;
- Only supports Windows Enterprise networks that are configured as a Windows Domain;
- Generates plans during operation using a planning system and a pre-configured adversary model based on ATT&CK™

https://github.com/mitre/caldera

Caldera


Interface
HTTP Server
Attacker Model
World State
Planner
Agent
RAT
Database
Execution Engine
Clients
Server

Blue Team Training Toolkit (BT3)

- Created by Juan J. Güelfo;
- Used for defensive security training;
- Features include:
  - Adversary Replication and Malware Simulation - simulate malware infections or targeted attacks with specific C&C communications.
  - Network Traffic Manipulation and Replay - customise and replay network traffic stored in PCAP files.
  - Malware Sample Simulation - artifacts are harmless files that produce the same MD5 checksum as real malicious files.

Atomic Red Team

- Library of tests;
- Mapped to the MITRE ATT&CK Framework;
- Should be able to run a test in less than five minutes;
- Test security controls and processes;
- Phased approach to running a test and evaluating results:
  1. Select a test
  2. Execute Test
  3. Collect Evidence
  4. Develop Detection
  5. Measure Progress

https://github.com/redcanaryco/atomic-red-team

Comparison

TACTIC NAME	INFECTION MONKEY	METTA	FlightSim	CALDERA	BT3	ATOMIC RED TEAM
Initial Access	Yes	No	No	No	No	Yes
Execution	Yes	Yes	Yes	Yes	Yes	Yes
Persistence	No	Yes	No	Yes	Yes	Yes
Privilege Escalation	No	Yes	No	Yes	No	Yes
Defense Evasion	No	Yes	Yes	Yes	No	Yes
Credential Access	Yes	Yes	No	Yes	Yes	Yes
Discovery	Yes	Yes	No	Yes	Yes	Yes
Lateral Movement	Yes	Yes	No	Yes	Yes	Yes
Collection	No	Yes	No	No	No	Yes
Exfiltration	No	Yes	No	Yes	No	Yes
Command & Control	Yes	Yes	Yes	No	Yes	Yes

Threat Pursuit VM (Beta)

- https://youtu.be/GrVj8h7uin0?t=148
- Ubuntu Virtual machine with various tools installed, including:
  - Adversarial Emulation:
    - Calderra Apache 2.0
      https://github.com/mitre/caldera/blob/master/LICENSE
    - APTSimulator MIT
      https://github.com/NextronSystems/APTSimulator/blob/master/LICENSE
    - FlightSim Creative Commons
      https://github.com/alphasoc/flightsim/blob/master/LICENSE
    - Atomic Red Team MIT
      https://github.com/redcanaryco/atomic-red-team/blob/master/LICENSE.txt

RedHunt-OS

- https://github.com/redhuntlabs/RedHunt-OS
- Ubuntu Virtual machine with various tools installed:
  - Attack Emulation:
    - Caldera
    - Atomic Red Team
    - DumpsterFire
    - Metta

Other resources

- List of Adversary Simulation tools
  - http://pentestit.com/adversary-emulation-tools-list/
- Mitre ATT&CK framework
  - https://attack.mitre.org
- Rabobank-cdc DeTT&CT framework
  - https://github.com/rabobank-cdc/DeTTECT
- Risky Business Podcast
  - https://risky.biz/RB587/ discussion about Mitre ATT&CK

Thank You!

END OF SESSION