Modeling the Active and Idle Durations of Network Hosts

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Introduction

Important to understand network behavior of hosts

Durations active and idle by host type

Patterns important for Situational Awareness

Baselining to detect anomalies

Decide whether a host should be in the inventory

Objectives of the Analysis

Distributions of the durations of active and idle times

Insights into different behaviors

Two metrics:

Probability of a host being active after a period of idleness

Conditional probability of a host becoming active within a time horizon
Given it has been idle for some time

Methodology

Flow data from the public domain (http://tools.netsa.cert.org/silk/referencedata.html)

SiLK (CERT/SEI) and Unix Tools

Spreadsheets

Focus on web servers initially

Methodology applicable to all types of hosts

References

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Analysis

Time series of network flows – out traffic

Time window = 23 hours

Time scale (bin size) = 1 hour

Convert volumes to a 0/1 series (1 => active)

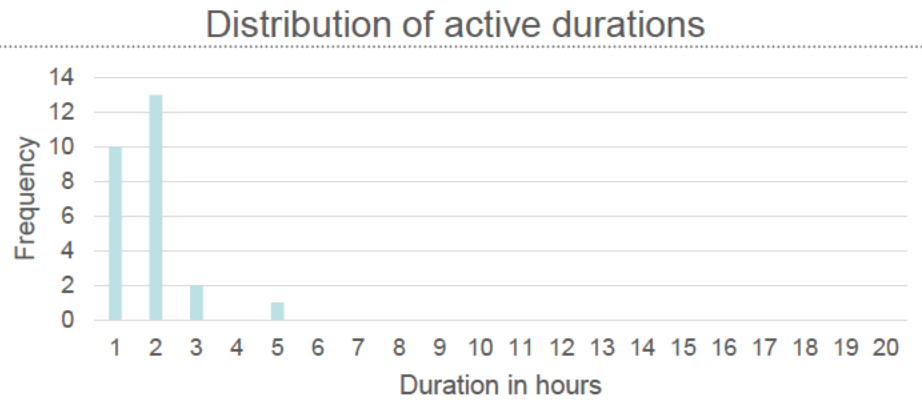
Compute the durations of active and idle times

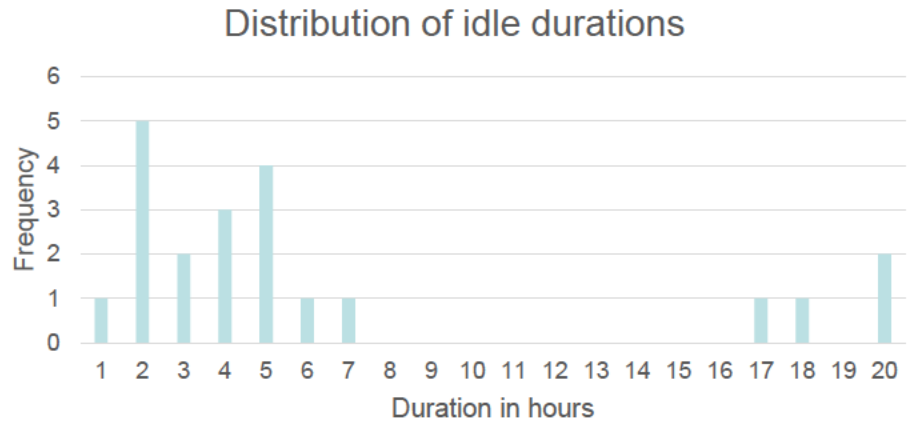
Plot the frequency distributions

Durations from Flows (Hypothetical)

Flows from rwcount	Conversion to 1/0	T	U
123	1		
456	1		
789	1	3	
0	0		
0	0		2
234	1		
90	1	2	
0	0		
0	0		
0	0		
0	0		4
55	1	1	
0	0		1
99	1		

Results


Distribution of active durations
Frequency
0
2
4
6
8
10
12
14
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Duration in hours


Distribution of idle durations
Frequency
0
1
2
3
4
5
6
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Duration in hours

Discussion

Active durations
- Very compact (low variation – narrower than Poisson)
- Mean = 1.8
- Weibull?

Idle durations
- Long tail or two populations
- Issues with estimating the metrics
- Censoring/Truncation problems

Future Work
- Need much longer time series
- Need to estimate the metrics with more data sets
- Correct for biases
- Compare across different host types
- Effects of varying the time scales, time windows and time horizons

Thank you!

Questions/comments?