## F

A complete system integration of stream-based IP flow-record querier

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**Masters Thesis** 

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#### ABSTRACT

Short summary of the contents in English. . .

We have seen that computer programming is an art, because it applies accumulated knowledge to the world, because it requires skill and ingenuity, and especially because it produces objects of beauty.

**— ?** [?]

#### **ACKNOWLEDGMENTS**

Put your acknowledgments here.



#### CONTENTS

			_				
1	INTRO	ODUCTION	1				
1	1 TRAFFIC MEASUREMENT APPROACHES						
	1.1	Capturing Packets	3				
	1.2	Capturing Flows	3				
	1.3	Remote Monitoring	3				
	1.4	Remote Metering	3				
2							
	2.1	NetFlow	5				
	2.2	IPFIX	5				
	2.3	sFlow	5				
3	LAN	GUAGES AND TOOLS	7				
	3.1	SQL-based Query Languages	7				
		3.1.1 NetFlow exports as relational DBMS	7				
		3.1.2 Data Stream Management System	7				
		3.1.3 Gigascope	7				
		3.1.4 Tribeca	7				
	3.2	Filtering Languages	7				
		3.2.1 flow-tools	7				
		3.2.2 nfdump	7				
	3.3	Procedural Languages	7				
		3.3.1 FlowScan	7				
		3.3.2 Clustering NetFlow Exports	7				
		3.3.3 SiLK Analysis Suite	7				
4	LEGA	AL CONSIDERATION	9				
II	STAT	TE OF THE ART	[1				
5	FLO	WY 1	13				
	5.1	D . D. 11	13				
		0.11	13				
		F11.	13				
			13				
		C FUL	13				
		3.6	13				
		5.1.6 Ungrouper	13				
	5.2		13				
		D T 11 1 DIV	13				
		D 1	13				
		TII. 1 D 1	13				
		D 1 1D 1361	13				
6	FLOWY IMPROVEMENTS USING MAP/REDUCE 15						
7	FLOWV 2.0						

8	FLO	WY: APPLICATIONS	19
	8.1	IPv6 Transition Failure Identification	19
	8.2	Cybermetrics: User Identification	19
	8.3	Application Identification using Flow Signatures	19
	8.4	TCP level Spam Detection	19
Ш	MO	TIVATION	21
IV	WOI	RK PLAN	23
9	DES	IGN	25
10	IMP	LEMENTATION	27
11	PER	FORMANCE EVALUATION	29
12	CON	ICLUSION	31
v	IMPI	LEMENTATION AND EVALUATION	33
13	DES	IGN	35
14	IMP	LEMENTATION	37
15	PER	FORMANCE EVALUATION	39
16	FUT	URE WORK	41
17	CON	ICLUSION	43
VI	APP	ENDIX	45
A	APP	ENDIX	47
BI	BLIO	GRAPHY	48

LIST OF FIGURES		
LIST OF TABLES		
LISTINGS		
ACRONYMS		



## Part I

#### INTRODUCTION

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TRAFFIC MEASUREMENT APPROACHES

- 1.1 CAPTURING PACKETS
- 1.2 CAPTURING FLOWS
- 1.3 REMOTE MONITORING
- 1.4 REMOTE METERING



#### FLOW EXPORT PROTOCOLS

- 2.1 NETFLOW
- 2.2 IPFIX
- 2.3 SFLOW



#### LANGUAGES AND TOOLS

- 3.1 SQL-BASED QUERY LANGUAGES
- 3.1.1 *NetFlow exports as relational DBMS*
- 3.1.2 Data Stream Management System
- 3.1.3 Gigascope
- 3.1.4 Tribeca
- 3.2 FILTERING LANGUAGES
- 3.2.1 *flow-tools*
- 3.2.2 *nfdump*
- 3.3 PROCEDURAL LANGUAGES
- 3.3.1 FlowScan
- 3.3.2 Clustering NetFlow Exports
- 3.3.3 SiLK Analysis Suite



#### LEGAL CONSIDERATION



## Part II

#### STATE OF THE ART

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#### FLOWY

#### 5.1 PROCESSING PIPELINE

- 5.1.1 Splitter
- 5.1.2 Filter
- 5.1.3 Grouper
- 5.1.4 Group-Filter
- 5.1.5 Merger
- 5.1.6 Ungrouper
- 5.2 PYTHON FRAMEWORK
- 5.2.1 PyTables and PLY
- 5.2.2 Records
- 5.2.3 Filters and Rules
- 5.2.4 Branches and Branch Masks



## FLOWY IMPROVEMENTS USING MAP/REDUCE





#### FLOWY: APPLICATIONS

- 8.1 IPV6 TRANSITION FAILURE IDENTIFICATION
- 8.2 CYBERMETRICS: USER IDENTIFICATION
- 8.3 APPLICATION IDENTIFICATION USING FLOW SIGNATURES
- 8.4 TCP LEVEL SPAM DETECTION



## Part III MOTIVATION



## Part IV

#### WORK PLAN

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#### DESIGN



#### **IMPLEMENTATION**



PERFORMANCE EVALUATION





## Part V

#### IMPLEMENTATION AND EVALUATION

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#### DESIGN





#### PERFORMANCE EVALUATION



#### FUTURE WORK





# Part VI

### APPENDIX





#### APPENDIX

Put your appendix here.

#### COLOPHON

This thesis was typeset with LATEX  $2_{\mathcal{E}}$  using Hermann Zapf's *Palatino* and *Euler* type faces (Type 1 PostScript fonts *URW Palladio L* and *FPL* were used). The listings are typeset in *Bera Mono*, originally developed by Bitstream, Inc. as "Bitstream Vera". (Type 1 PostScript fonts were made available by Malte Rosenau and Ulrich Dirr.)

The typographic style was inspired by ? 's genius as presented in *The Elements of Typographic Style* [?]. It is available for LATEX via CTAN as "thesis".

NOTE: The custom size of the textblock was calculated using the directions given by Mr. Bringhurst (pages 26–29 and 175/176). 10 pt Palatino needs 133.21 pt for the string "abcdefghijklmnopqrstuvwxyz". This yields a good line length between 24–26 pc (288–312 pt). Using a "double square textblock" with a 1:2 ratio this results in a textblock of 312:624 pt (which includes the headline in this design). A good alternative would be the "golden section textblock" with a ratio of 1:1.62, here 312:505.44 pt. For comparison, DIV9 of the typearea package results in a line length of 389 pt (32.4 pc), which is by far too long. However, this information will only be of interest for hardcore pseudotypographers like me.

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\settowidth{\abcd}{abcdefghijklmnopqrstuvwxyz}
\the\abcd\ % prints the value of the length
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Please see the file thesis.sty for some precalculated values for Palatino and Minion.

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145.86469pt
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DECLARATION	
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Bremen, Germany, June 2012	
	 Vaibhav Bajpai