

Kosher Salt - ST_142

Release 1.4.5

Salt Stack

CONTENTS

1	Intro	1
	1.1	Kosher Salt
	1.2	What Are We Going to Cover?
	1.3	Remote Execution
	1.4	Salt Cloud
	1.5	Configuration Management
	1.6	Extending Salt
	1.7	Course Format
	1.8	Introductions
	1.9	Class Start
	1.10	Emergencies
	1.11	Emergency Exits and Restrooms
	1.12	Lectures, Breaks and Lunches
		Lab Environment
	1.14	Lab Goals
		What is Salt?
	1.16	Not Just Configuration Management
		Remote Execution
	1.18	Open Event System
		Layered Configuration Management
	1.20	Simplicity
	1.21	Manual Conventions
	1.22	Manual Conventions
2	Divin	
	2.1	Diving Into Salt - Objectives
	2.2	Getting The Code
	2.3	The Code
	2.4	Installing Salt
	2.5	Split Packages
	2.6	Salt Bootstrap
	2.7	Firewalling Salt
	2.8	Salt and the Firewall
	2.9	Basic Master Configuration
	2.10	Basic Server Configuration
	2.11	Basic Minion Configuration
	2.12	Find the Salt Master
	2.13	Security Settings
	2.14	Starting the Daemons
	2.15	Start the Salt

	2.16	Run Directly	14
	2.17	Authentication	15
	2.18	RSA Keys	15
	2.19	Master Holds Minion Public Keys	15
	2.20	Minion Validating the Master	15
	2.21	Managing Keys With Salt-Key	16
	2.22	Managing Keys With Salt-Key	16
	2.23	Navigating the Keys	18
	2.24	The pki_dir	18
	2.25	Lab 1	19
	2.25	Task 1	19
	2.20	1dSk 1	19
3	Salt (Cloud	23
	3.1	Salt Cloud - Objectives	23
	3.2	Installing Salt Cloud	24
	3.3	Installing Salt Cloud	24
	3.4	Salt Cloud Configuration	25
	3.5	Global Options	25
			28
	3.6	Querying Cloud Providers	
	3.7	Running Queries	28
	3.8	Gathering Cloud Data	30
	3.9	Available Data	30
	3.10	Cloud Profiles	32
	3.11	Profiles - The VM to Build	32
	3.12	Creating Cloud VMs With Profiles	33
	3.13	Using a Provider to Create VMs	33
	3.14	Destroying VMs	34
	3.15	Destruction!	34
	3.16	Cloud Maps	35
	3.17	Defining a Map of VMs	35
	3.18	Actions and Functions	37
	3.19	Provider-Specific Commands	37
	3.20	Lab 2	38
	3.21	Task 1	38
	3.22	Task 2	39
	3.22		39
		Task 3	
	3.24	Task 4	40
4	Salt (Command	43
	4.1	The Salt Command - Objectives	43
	4.2	Command Structure	44
	4.3	Command Structure	44
	4.4	Targets	45
	4.5		45
		Targeting	
	4.6	Many Ways to Target	45
	4.7	Matching by id	46
	4.8	Minion id	46
	4.9	Glob Targeting	46
	4.10	Regular Expression Matching	46
	4.11	List Matching	46
	4.12	Matching by IP address	47
	4.13	Matching by IP Address	47
	4.14	Grains	48
	4.15	What are Grains?	48

	4.16	Matching by Grains
	4.17	Grains in the Minion Configuration
	4.18	Globs or Regex
	4.19	Pillar
	4.20	What is Pillar?
	4.21	Targeting with Pillar
	4.22	Compound Matching
	4.23	Compound - logical targets
	4.24	Nodegroups
	4.25	Functions
	4.26	Functions, the Salt System Management stdlib
	4.27	
	4.28	Automatic Platform Detection
	4.29	Self Documenting Functions
	4.30	Reading the Inline Docs
	4.31	Calling Docs From the salt Command
	4.32	Looking in the Man Pages
	4.33	docs.saltstack.org
	4.34	Some Core Functions
	4.35	Command Execution
	4.36	Package Management
	4.37	Network Data
	4.38	Test
	4.39	User
	4.40	Bring it Together
	4.41	Calling Commands
	4.42	Lab 3
	4.43	Task 1
	4.44	Task 2
		THOR 2
5	Remo	ote Execution in Depth 61
	5.1	Remote Execution - Objectives
	5.2	Returners
	5.3	Returning Data
	5.4	Many Executions, One Publication
	5.5	Compound Commands
	5.6	Runners
	5.7	Runners
	5.8	Available Runners
	5.9	Reporting
	5.10	Custom Deployments
	5.11	Salt Job System
	5.12	Jobs Runner
	5.13	Job IDs
	5.14	Minion proc System
	5.15	Job Lookup
	5.16	Lookup Running Jobs
	5.17	Lookup Old Jobs
	5.18	Job Cache
	5.19	Signaling Jobs
	5.20	Signal Jobs
	5.21	Kill and Term Jobs
	5.22	Salt Call
	5.23	Salt Call Command

	5.24	Peer Communication	70
	5.25	Minions Sending Commands	70
	5.26	Configuring the Peer Interface	70
	5.27	Configuring the Peer Runner	70
	5.28	Executing Peer Commands	71
	5.29	Running Peer Commands	71
	5.30	Executing Peer Runners	71
	5.31	Salt SSH	72
	5.32	Salt SSH	72
	5.33	Minion Optional	72
	5.34	Calling Salt SSH	72
	5.35	Rosters	73
			73
		Rosters	
	5.37	Flat Roster	73
	5.38	Scan Roster	73
		Lab 4	74
	5.40	Task 1	74
	5.41	Task 2	74
	5.42	Task 3	75
	5.43	Task 4	75
6	Salt S		77
	6.1	Salt States - Objectives	77
	6.2	What Are States?	78
	6.3	Salt States	78
	6.4	State System in Layers - Low Layers	79
	6.5	State System in Layers - Low	79
	6.6	High Layers	81
	6.7	High Data - Easily Define Complex Low Data	81
	6.8	SLS Files	81
	6.9	High State Data	81
	6.10	The State Tree	82
	6.11	The State Tree	82
	6.12	State Tree Configuration	82
	6.13	The Top File	83
	6.14	The Top File	83
	6.15	Defining the Top File	83
		Making States	
		Getting the Right Data	85
	6.17		85
	6.18	Represent!	
	6.19	The SLS File	86
	6.20	Salt SLS Files	86
	6.21	Basic States	88
	6.22	Basic States	88
	6.23	Bring it Together	90
	6.24	Simplicity!	90
	6.25	Example to Merge it All Together	90
	6.26	Running States	92
	6.27	Managing State Runs	92
	6.28	Over State System	94
	6.29	Orchestrate States	94
	6.30	Ordering in Groups	94
	6.31	The overstate.sls	94
	6.32	Executing the Over State	95

	6.33		96
	6.34	Task 1	96
	6.35	Task 2	96
	6.36	Task 3	97
	6.37	Task 4	98
7			01
	7.1		01
	7.2	High Data Structure	
	7.3	The Data	
	7.4	The Include Statement	
	7.5	Including other SLS Files	.03
	7.6	Extend	.05
	7.7	Extending External SLS Data	.05
	7.8	The Extend Declaration	
	7.9	Extend is a Top Level Declaration	.05
	7.10	Rules to Extend By	.06
	7.11	Requisites	07
	7.12	Requisite Declaration	07
	7.13	Multiple Requisites	07
	7.14	The require Requisite	.08
	7.15	The watch Requisite	.08
	7.16	watch and the mod_watch Function	.09
	7.17	Finite Ordering	11
	7.18	Ordering States	
	7.19	The Order	11
	7.20	The Order Option	11
	7.21	Name and Names!	12
	7.22	ID vs Name	12
	7.23	One ID to Many Names	12
	7.24	Requisite In	14
	7.25	The Requisite "in" Declaration	14
	7.26	Using Prereq	15
	7.27	Using the Prereq Requisite	15
	7.28	How Prereq Works	15
	7.29	Use and use_in	16
	7.30	use and use_in Requisites	16
	7.31	Startup States	17
	7.32		17
	7.33	Providers	18
	7.34	State Providers	18
	7.35	Render Data How You Want	19
	7.36	Renderers	19
	7.37	Multiple Renderers	19
	7.38		20
	7.39		20
	7.40		21
	7.41		21
	7.42		22
	7.43	Task 1	22
	7.44	Task 2	23
	7.45	Task 3	23
	7.46	Task 4	24

8	Salt I	Extras 1	127
	8.1	Salt Extras	127
	8.2	Jinja Basics	128
	8.3	Jinja - Templating SLS	128
	8.4	Jinja Variables	128
	8.5	Salt Data in Jinja	
	8.6	Data passed into Jinja	
	8.7	Pillar of Salt	
	8.8	Pillar of Salt	
	8.9	Building Pillar	
	8.10	Declaring the Master Pillar	
	8.11	Pillar Configuration	
	8.12	Setting up the Pillar	
	8.13	Minion Specific Pillar	
		Private Pillars	
		External Pillar	
		External Pillar	
		Parameterize Everything	
		Parameterizing	
		Using the "get" Functions	
		Client ACLs	
			137
			137
		External Job Cache	
		External Job Cache	
	8.25	Salt File Server	
	8.26	Salt File Server	
	8.27	Asynchronous	
		Environment Aware	
	8.29	Gzip Files	
	8.30	Getting Files	
	8.31	Salt Wheel System	
	8.32	Salt Wheel System	
	8.33	External Authentication	142
	8.34	External Authentication System	142
		External Authentication Example	
	8.36	LAB 7 1	143
	8.37	Task 1	143
	8.38	Task 2	44
	8.39	Task 3	145
9	Exter		149
	9.1		149
	9.2	Writing Modules	150
	9.3	Exposing Functions	150
	9.4	Return data	150
	9.5	Args and KWargs	151
	9.6	Modules and kwargs	151
	9.7		151
	9.8		152
	9.9		152
	9.10		152
	9.11		153
	9.12	Thevirtual function	

		Loader System	
	9.14	Module Loader	154
		Loader Configuration	
	9.16	Distributing Modules Via file_roots	154
	9.17	Writing Grains	155
	9.18	Functions	155
	9.19	Static Data	155
	9.20	Return Data	
	9.21	Writing States	
	9.22	Matching Components	
	9.23	State Return Data	
	9.24	Test Interface	
	9.25	Writing Returners	
	9.26	Getting Configuration Data	
	9.27	Returner Function	
	9.27	Writing Renderers	
	9.29	Single Function Loader	
	9.30	Passing the Right Data	
	9.31	Loading the Data	
		Writing External Pillars	
	9.33	Configuration to Python	
		Example	
		LAB 8	
		Task 1	
	9.37	Task 2	167
10	OTC 1		1.00
10	Topol	logy	169
10			1.00
10	10.1	Salt Topologies	
10	10.1 10.2	Salt Topologies	170
10	10.1 10.2 10.3	Salt Topologies	170 170
10	10.1 10.2 10.3 10.4	Salt Topologies	170 170 172
	10.1 10.2 10.3 10.4 10.5	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic	170 170 172 172
	10.1 10.2 10.3 10.4 10.5 10.6	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups	170 170 172 172 172
	10.1 10.2 10.3 10.4 10.5 10.6 10.7	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent	170 170 172 172 172 172
	10.1 10.2 10.3 10.4 10.5 10.6 10.7	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic	170 170 172 172 172 172 173
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic	170 170 172 172 172 172 173 173
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic	170 170 172 172 172 172 173 173
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic Standalone Minion	170 170 172 172 172 173 173 174
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10 10.11	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic	170 170 172 172 172 173 173 174 174
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10 10.11 10.12	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic Standalone Minion Standalone Minion Configuring the File Client	170 170 172 172 172 173 173 174 174
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10 10.11 10.12 10.13	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic Standalone Minion Standalone Minion Configuring the File Client Minion Swarm Tests	170 170 172 172 172 173 173 174 174
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10 10.11 10.12 10.13 10.14	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic Standalone Minion Standalone Minion Configuring the File Client Minion Swarm Tests Minion Swarming	170 170 172 172 172 173 173 174 174 174
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10 10.11 10.12 10.13 10.14 10.15	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configure the Syndic Standalone Minion Standalone Minion Configuring the File Client Minion Swarm Tests Minion Swarming Using the Swarm	170 170 172 172 172 173 173 174 174 174 175
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10 10.11 10.12 10.13 10.14 10.15 10.16	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic Standalone Minion Standalone Minion Configuring the File Client Minion Swarm Tests Minion Swarming Using the Swarm Operations For the Swarm	170 172 172 172 172 173 173 174 174 175 175 175
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10 10.11 10.12 10.13 10.14 10.15 10.16 10.17	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic Standalone Minion Standalone Minion Configuring the File Client Minion Swarm Tests Minion Swarming Using the Swarm Operations For the Swarm Event System	170 170 172 172 172 173 173 174 174 175 175 175 175
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10 10.11 10.12 10.13 10.14 10.15 10.16 10.17 10.18	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic Standalone Minion Standalone Minion Configuring the File Client Minion Swarm Tests Minion Swarming Using the Swarm Operations For the Swarm Event System The Event System	170 172 172 172 172 173 173 174 174 175 175 175 176 176
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10 10.11 10.12 10.13 10.14 10.15 10.16 10.17 10.18 10.19	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic Standalone Minion Standalone Minion Configuring the File Client Minion Swarm Tests Minion Swarming Using the Swarm Operations For the Swarm Event System The Event System Tags and Data	170 172 172 172 172 173 173 174 174 175 175 175 176 176
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10 10.11 10.12 10.13 10.14 10.15 10.16 10.17 10.18 10.19 10.20	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic Standalone Minion Standalone Minion Configuring the File Client Minion Swarm Tests Minion Swarming Using the Swarm Operations For the Swarm Event System The Event System Tags and Data Minions Fire Master Events	170 170 172 172 172 173 173 174 174 175 175 175 176 176 176
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10 10.11 10.12 10.13 10.14 10.15 10.16 10.17 10.18 10.19 10.20 10.21	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic Standalone Minion Standalone Minion Configuring the File Client Minion Swarm Tests Minion Swarming Using the Swarm Operations For the Swarm Event System The Event System Tags and Data Minions Fire Master Events Listening to Events	170 172 172 172 172 173 173 174 174 175 175 175 176 176 176
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10 10.11 10.12 10.13 10.14 10.15 10.16 10.17 10.18 10.19 10.20 10.21 10.22	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic Standalone Minion Standalone Minion Configuring the File Client Minion Swarm Tests Minion Swarming Using the Swarm Operations For the Swarm Event System The Event System Tags and Data Minions Fire Master Events Listening to Events Using the Event API	170 172 172 172 172 173 173 174 174 175 175 175 176 176 176 177
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10 10.11 10.12 10.13 10.14 10.15 10.16 10.17 10.18 10.19 10.20 10.21 10.22 10.23	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic Standalone Minion Standalone Minion Configuring the File Client Minion Swarm Tests Minion Swarming Using the Swarm Operations For the Swarm Event System The Event System Tags and Data Minions Fire Master Events Listening to Events Using the Event API React to Events	170 172 172 172 173 173 174 174 175 175 175 176 176 176 177 177
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10 10.11 10.12 10.13 10.14 10.15 10.16 10.17 10.18 10.19 10.20 10.21 10.22 10.23 10.24	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic Standalone Minion Standalone Minion Configuring the File Client Minion Swarm Tests Minion Swarming Using the Swarm Operations For the Swarm Event System The Event System The Event System Tags and Data Minions Fire Master Events Listening to Events Using the Event API React to Events Reactor System	170 170 172 172 172 173 173 174 174 175 175 175 176 176 176 177 177 178 178
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10 10.11 10.12 10.13 10.14 10.15 10.16 10.17 10.18 10.19 10.20 10.21 10.22 10.23 10.24 10.25	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic Standalone Minion Standalone Minion Configuring the File Client Minion Swarm Tests Minion Swarming Using the Swarm Operations For the Swarm Event System The Event System The Event System Tags and Data Minions Fire Master Events Listening to Events Using the Event API React to Events Reactor System Mapping Events to Reactor SLS Files	170 170 172 172 172 173 173 174 174 175 175 175 176 176 176 177 177 178 178 178
	10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10 10.11 10.12 10.13 10.14 10.15 10.16 10.17 10.18 10.19 10.20 10.21 10.22 10.23 10.24 10.25 10.26	Salt Topologies Multi-Master Multi Master Syndic The Salt Syndic Logical Groups Transparent Configure the Syndic Configuring the Syndic Standalone Minion Standalone Minion Configuring the File Client Minion Swarm Tests Minion Swarming Using the Swarm Operations For the Swarm Event System The Event System Tags and Data Minions Fire Master Events Listening to Events Using the Event API React to Events Reactor System Mapping Events to Reactor SLS Files	170 170 172 172 172 173 173 174 174 175 175 175 176 176 176 177 177 178 178 178 178 179

0.28	chedule Recurring Executions	 180
0.29	alt Scheduling	 180
0.30	it File Server Backend	 181
0.31	SitFS File Server Backend	 181
0.32	imple Configuration	 181
0.33	xtended Fileserver Backends	 182
0.34	xtended Backends	 182
0.35	Multiple Backends	 182
0.36	alt API	 183
0.37	alt API	 183
	'urning on the API	
0.39	ab 9	 184
0.40	ask 1	 184