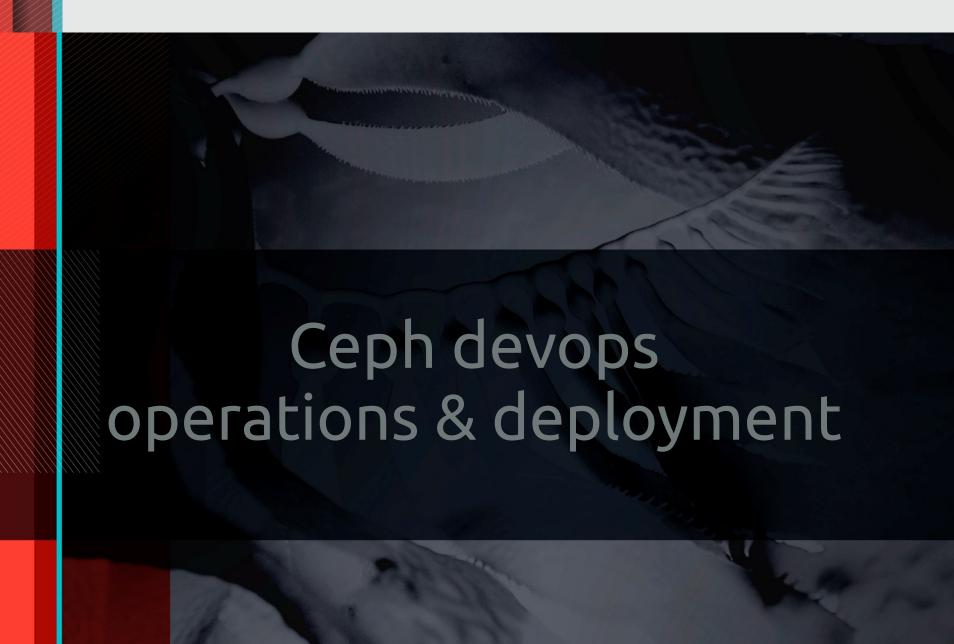
inktank



other ceph talks

Block Storage for the Cloud, a Pilot with Enterprise Use-cases at BMW

thu 10am, fri 8:30am

Janos Mattyasovszky, BMW Andreas Poeschl Project Lead, BMW

Ceph: Much More Than Just a Distributed File System

wed 1pm, thu 10am

Lars Marowsky-Brée, Architect Storage/HA, SUSE Udo Seidel, O/S Services Manager, Amadeus Data Processing GmbH

infrastructure as code

infrastructure is code

scale

scale



scale scale scale sca scale scale scale sca









for h in host{1,2,3,4} do ssh \$h apt-get install ... done

dsh -g foo apt-get install ...

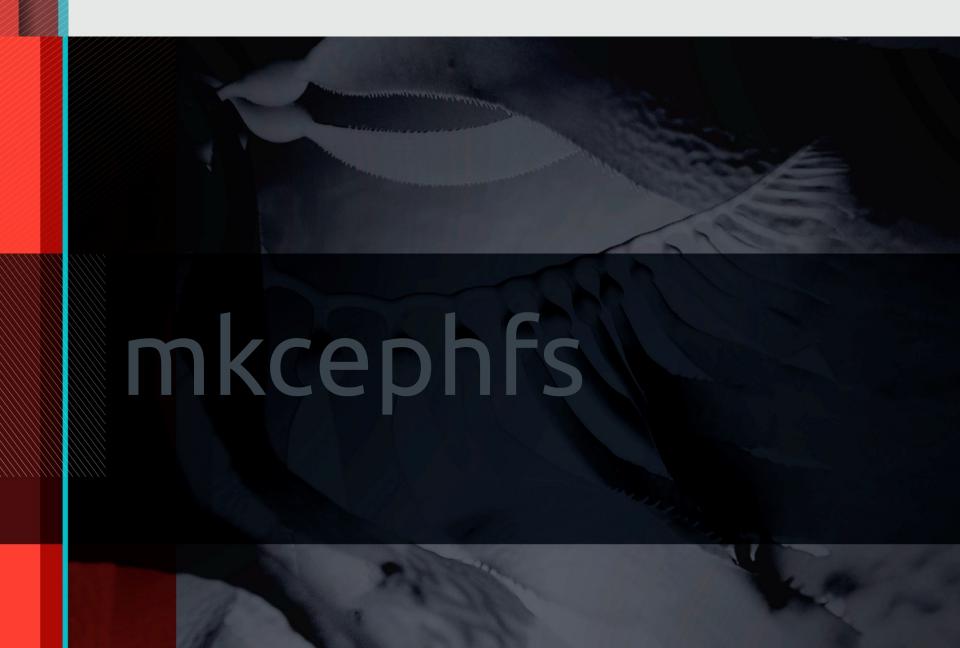
dsh

```
[0 tv@dreamer ~1$ dsh -q plana uptime
ubuntu@plana01.front.sepia.ceph.com: 14:19:49 up 167 days, 21:32, 1 user, load average: 0.00, 0.01, 0.05
ubuntu@plana02.front.sepia.ceph.com:
                                     14:19:49 up 1 day, 3:29, 0 users, load average: 0.95, 1.03, 1.01
ubuntu@plana03.front.sepia.ceph.com:
                                     14:19:49 up 1 day, 3:29, 0 users, load average: 1.52, 1.28, 1.17
                                    14:19:52 up 18 min, 1 user, load average: 3.63, 3.51, 2.51
ubuntu@plana04.front.sepia.ceph.com:
ubuntu@plana05.front.sepia.ceph.com:
                                     17:19:52 up 17 days, 22:59, 0 users, load average: 0.05, 0.03, 0.05
ubuntu@plana06.front.sepia.ceph.com:
                                     14:19:53 up 18 days, 0 min, 1 user, load average: 0.31, 0.23, 0.17
ubuntu@plana07.front.sepia.ceph.com:
                                     14:19:53 up 18 min, 1 user, load average: 5.29, 4.98, 3.11
ubuntu@plana08.front.sepia.ceph.com:
                                    14:19:53 up 44 min, 0 users, load average: 0.00, 0.01, 0.05
ubuntu@plana09.front.sepia.ceph.com:
                                     14:19:53 up 18 min, 1 user, load average: 6.56, 6.33, 3.93
                                    14:19:54 up 48 days, 23:30, 0 users, load average: 0.00, 0.01, 0.05
ubuntu@plana10.front.sepia.ceph.com:
ubuntu@plana11.front.sepia.ceph.com:
                                     14:19:54 up 44 min, 0 users, load average: 0.00, 0.01, 0.04
ubuntu@plana12.front.sepia.ceph.com:
                                     14:19:54 up 43 min, 0 users, load average: 0.00, 0.01, 0.05
ubuntu@plana13.front.sepia.ceph.com:
                                     14:19:55 up 43 min, 0 users, load average: 0.01, 0.03, 0.05
ubuntu@plana14.front.sepia.ceph.com:
                                     14:19:55 up 43 min, 0 users, load average: 0.00, 0.01, 0.04
ubuntu@plana15.front.sepia.ceph.com:
                                     17:19:55 up 17 days, 22:52, 0 users, load average: 0.00, 0.01, 0.05
ubuntu@plana16.front.sepia.ceph.com:
                                     14:19:55 up 43 min, 0 users, load average: 0.00, 0.01, 0.05
ubuntu@plana17.front.sepia.ceph.com:
                                    14:19:55 up 43 min, 0 users, load average: 0.00, 0.01, 0.04
ubuntu@plana18.front.sepia.ceph.com:
                                     14:19:57 up 102 days, 1:03, 0 users, load average: 1.07, 0.62, 0.29
ubuntu@plana19.front.sepia.ceph.com:
                                    14:19:57 up 43 min, 0 users, load average: 0.00, 0.01, 0.05
ubuntu@plana20.front.sepia.ceph.com:
                                     14:19:57 up 43 min, 0 users, load average: 0.00, 0.02, 0.04
ubuntu@plana21.front.sepia.ceph.com:
                                     14:19:58 up 43 min, 0 users, load average: 0.00, 0.01, 0.05
ubuntu@plana22.front.sepia.ceph.com:
                                     14:19:58 up 43 min, 0 users, load average: 0.00, 0.01, 0.05
ubuntu@plana23.front.sepia.ceph.com:
                                     14:19:58 up 43 min, 0 users, load average: 0.00, 0.01, 0.04
                                     14:19:58 up 43 min, 0 users, load average: 0.00, 0.01, 0.04
ubuntu@plana24.front.sepia.ceph.com:
ubuntu@plana25.front.sepia.ceph.com:
                                     14:19:58 up 43 min, 0 users, load average: 0.00, 0.01, 0.05
ubuntu@plana26.front.sepia.ceph.com:
                                     14:19:59 up 18 days, 1 min, 3 users, load average: 0.11, 0.05, 0.05
ubuntu@plana27.front.sepia.ceph.com:
                                     14:19:59 up 18 days, 0 min, 0 users, load average: 0.04, 0.04, 0.05
ubuntu@plana28.front.sepia.ceph.com:
                                     14:19:59 up 18 days, 0 min, 0 users, load average: 0.00, 0.01, 0.05
ubuntu@plana29.front.sepia.ceph.com:
                                     14:19:59 up 18 days, 0 min, 0 users, load average: 0.03, 0.11, 0.13
                                     14:20:00 up 43 min, 0 users, load average: 0.04, 0.04, 0.05
ubuntu@plana30.front.sepia.ceph.com:
ubuntu@plana31.front.sepia.ceph.com:
                                     14:20:00 up 43 min, 0 users, load average: 0.03, 0.04, 0.05
                                     14:20:00 up 18 days, 0 min, 0 users, load average: 0.00, 0.02, 0.05
ubuntu@plana32.front.sepia.ceph.com:
ubuntu@plana33.front.sepia.ceph.com:
                                     14:20:01 up 18 days, 0 min, 0 users, load average: 0.00, 0.01, 0.05
ubuntu@plana34.front.sepia.ceph.com:
                                     14:20:01 up 19 min, 1 user, load average: 1.75, 1.85, 1.21
ubuntu@plana35.front.sepia.ceph.com:
                                     14:20:01 up 43 min, 0 users, load average: 0.00, 0.01, 0.04
ubuntu@plana37.front.sepia.ceph.com:
                                     14:20:01 up 43 min, 0 users, load average: 0.00, 0.01, 0.05
```

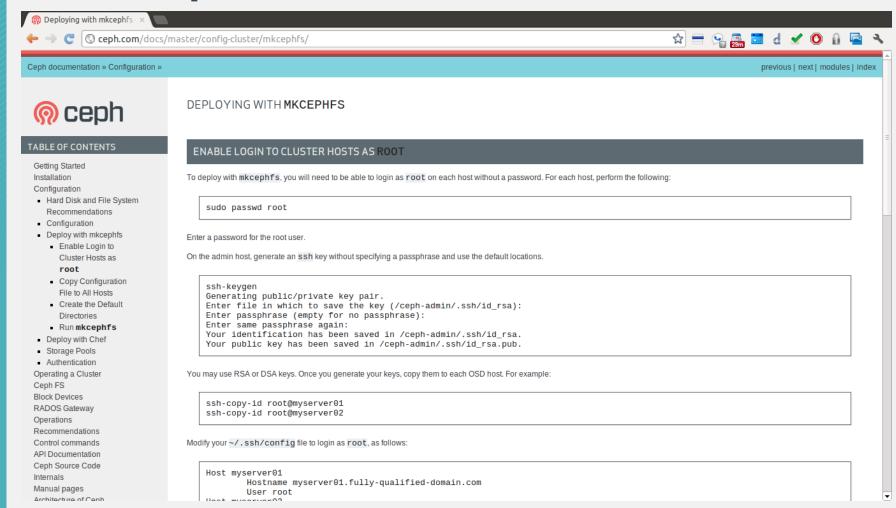
cssh

'erminal		total Military 1		nen 😍		Graph this data and manag	New release '12,04 LTS' ava Run 'dorrelease-upgrade' to	
			s system at https://landscape.ca nomical.com/ New release '12.04 LTS' availabl	*Bocumentation: https:// Last login; Fri Aug 24 14:1 ubuntufplans61;* uptime 14:55:01 up 1:02, 2 user s, load average: 1,41, 1,4 0, 0,39	* Bocumentation: https:// Last login; Wed Jul 25 08:1 ubuntu0plana70; * uprime 14:95:00 up 3 min, 1 user load average: 0.08, 0.14	Graph this data and manag New release '12,04 LTS' ava Run 'do-release-upgrade' to		* Bocumentation: http
Bocumentation: https:// st login: Thu Aug 23 17:2	* Bocumentation: https://h Last login: Non Aug 20 09:33 ubuntufplans46;** uptime 14:55:01 up 3 ain, 1 user, load average: 0.04, 0.07,	"Bocumentation: https:// ubuntuEplaneS9:"# uptime 14:55:01 up 1:33, 1 user , load average: 0,00, 0,01		ubuntu@plana54;"\$ uptime 14;95;01 up 1;02, 2 user	ubuntu@plana70;"\$ uptime 14;55;01 up 3 min, 1 user	Last login; Wed Aug 8 14:0	Last login; Tue Aug 7 10:2 ow 10.93.188.142 ubuntuMplamai8:"\$ uptime 14:95:01 up 102 days, 1:3 8, 1 user, load average: 0.01, 0.02, 0.05 ubuntuMplamai8:"\$ []	* Bocumentation: htt Last login: Wed Aug 22 ubuntuAplanali: "\$ upti 14:95:01 up 3 min, 1 load average: 0.18, 0.17
untu@plana55;"\$ uptime 4:55:01 up 1:01, 1 user load average: 1.69, 1.47	14:55:01 up 3 min, 1 user, load average: 0.04, 0.07,		e. Run 'dommelease-upgrade' to ade to it.	0, 0,99 ubuntu@plana54:"\$ []	, 0.06 ubuntuRplana70;"\$ []	14:55:01 up 127 days, 22:5	14:55:01 up 102 days, 1:3	, load average; 0,18,
0.92 untuWplana55;"≸ []	0.04 ubuntu@plana46;"\$ []	ubuntu@plana89;"\$ []	Last login; Hon Aug 6 13;4 2012	aconomistants a D	acutospianiro, 2 []	Last login: Wed Hug 8 14:0 ubuntuWplana93:7% uptime 14:95:01 up 127 days, 22:5 9, 1 usar, load average: 0,00, 0,01, 0,06 ubuntuWplana93:7% []	0.01, 0.02, 0.05 ubuntuRolana18:75 []	ubuntu@plana11;"S [
			2012 ubuntu@plana66:"S uptime 14:85:01 up 130 days, 12:2 3. 2 users. load average: 0,01, 0,02, 0,56 ubuntu@plana66:"S []			3,6,0-rc2-ceph-00143-g6e952		eth2: 10,214,144,30
			3, 2 users, load average: 0.01, 0.02, 0.05			† Documentation: https://	ceph=00143-g6e952db x86_64)	Graph this data and
				* Bocumentation: https:// Last login: Fri Aug 24 07:3 ubunt@plan583:"\$ uptime 14:55:01 up 18:58, 1 user , load average: 0.00, 0.01 , 0.05	* Bocumentation: https://	com/ Last login: Thu Mag 23 20:5 om 10.99.118.190 ubertuBplana65:"5 uptime 14:95:01 up 3 min. 1 user load awerage: 0.05, 0.11	* Nocumentation: https:// Last login: Thu Aug 23 13:1 18.18 ubuntuAplama25:"\$ uptime	Graph this data and ://landscape.canonical Last login; Thu Aug 23 18,198 ubunta@planafor"s upti 14:55:01 up 43 days. , i user, load avera .00, 0,01, 0,05 ubunta@planafor"s II
Occumentation: https://	* Bocumentation: https://h		3.6.0-mc2-ceph-00143-g6e952	ubuntu@plana58:"\$ uptime 14:55:01 up 16:58, 1 user	* Documentation: https:// ubuntu@plana63:"\$ uptime 14:55:01 up 3 min, 1 user , load average: 0.03, 0.07	om 10,99,118,190 ubuntu@plana16;"\$ uptime	18.18 ubuntu@plana25:"\$ uptime	18,198 ubuntu@plana10;"\$ upti
Bocumentation: https:// t login: Fr: Aug 17 08:5 ntu8plona60:"% uptime :55:01 up 3 min, 1 user load average: 0,06, 0,12	* Bocumentation: https://h Last login: Thu Aug 16 14:20 ubuntuRplana45: ** uptime 14:55:01 up 3 aim, 1 user, load average: 0.02, 0.04,	* Bocumentation: https:// com/	* Documentation: https://	, load average: 0,00, 0,01 , 0,05 ubuntu@plana58:~* []	, 0.04 ubuntuBplana69:~\$	load average: 0.05, 0.11	14:55:01 up 3 min, 1 user , load average: 0,03, 0,08 , 0.05	, 1 user, load avera
		com/ Last login; Thu Pug 23 11:0 on 10,214,131,14 ubuntuplplandS; "\$ uptime 14:55:01 up 7 days, 16:25, 1 user, load sowrage; 0, 00, 0,10, 0,23	com/ Last login: Thu Pug 16 11:1 on 10.214.140,117 ubuntu6plana38:"\$ uptime 14:95:01 up 3 min. 1 user load average: 0.03, 0.06	ubuntukplanab8;"\$ [ubuntugpianaib; \$ []	ubuntu@plana25:"\$ [ubuntu@plana10:"\$ []
ntumiplana60;"% []	ubuntuRplana45;"\$ []	14:95:01 up 7 days, 16:25,	14:95:01 up 3 min, 1 user			3,6,0-rc2-ceph-00143-g6e952	ceph=00143-g6e952db x86_64)	ceph=00141-g532b65e x6
		00, 0,01, 0,23 ubuntu@plana65;"\$ []	. 0,04 ubuntu#plana38;"\$ ∏			* Documentation: https:// com/	* Nocumentation: https:// Last login: Fri Aug 24 05:3 18,190	* Nocumentation: htt Last login: Fri Aug 24 18.178
				"Bocumentation: https:// Last login: Fri Aug 17 09:5 (burbusplannS2: uptime 14:95:01 up 3 min, 1 user load average: 0,03, 0,08 ,0,05	* Bocumentation: https:// ubuntu@plana73; *\$ uptime 14:55:01 up 3 min, 1 user , load average: 0.07, 0.07	com/ cast login: Men Aug 20 21:0 ca 10,224,140,117 dountubplans20:"\$ uptime 14:55:01 up 3 inin, 1 user , load average: 0,02, 0,05 ,0,03 ubuntubplans20:"\$ []	Last login: Fri Aug 24 05:3 18.190	Last login: Fri Aug 24 18.178
		/Linux 3.6.0+rc2+ceph=00143 52cb x66_64)		ubuntu@plana62:"\$ uptime 14:55:01 up 3 min, 1 user	14:55:01 up 3 min, 1 user load average: 0,07, 0,07	14:55:01 up 3 min, 1 user	18.190 ubuntu@plana24:"\$ uptime 14:55:01 up 3 min, 1 user , load average: 0.02, 0.06	18.178 ubuntu@plana(9:"\$ upti 14:55:01 up 15 min, rs, load average: 2.0 81, 0.33 ubuntu@plana(9:"\$ []
Bocumentation: https:// : login: Thu Aug 23 21:3	* Bocumentation: https://h Last login: Sun Jul 29 12:39		* Bocumentation: https:// ubuntu@plana90;"\$ uptime	, load average: 0.03, 0.08 , 0.05	, 0.04 ubuntu@plana73:~\$ [, 0.03 uhuntuRolana20:**\$ []	, 0.04 ubuntu@plana24:"\$ []	81, 0.33 ubuntu@plana@t**\$ []
tu8plana52;"\$ uptime 95;01 up 1 day, 5;14,	* Bocumentation: https://h Last login; Sun Jul 29 12:39 ubuntu6plan44:*\$ uptime 14:95:01 up 3 min, 1 user, load average: 0.09, 0.07,	* Bocumentation: https:// ubuntu.com/	* Bocumentation: https:// ubuntukplana60:"% uptime 14:55:01 up 3 min, 1 usen , load average: 0.10, 0.24	ubuntu@plana62:~\$ [3,6,0-nc2-ceph-00143-s6e952		
Bouwerhator: https://s. Logn: The May 23 213 studge land27 from 12 113 studge land27 from 12 114 uners, load owerwage: 0. 0.19.1.44 studge land22:*s []	load average; 0,09, 0,07, 0,04 ubuntu@plana44:"S	ubuntu.com/ Last login: Wed Rug 22 14:1 2012 from 10.99,118,186	ubuntuAplana90:"\$ []			* Boomentation: https://	-00244-gFb3f3d7 x86_64)	* Documentation: htt
	uconcuspiana+4; 3 []	ubuntu@plana88:"S uptime 14:55:01 up 3 min, 1 user , load average: 0.04, 0.09					* Documentation: https:// Last login: Fri Aug 24 08:3	Last login: Tue Aug 7 ubuntu@plana06:"\$ upt:
		, 0.05 uhuntufisianaes:"\$ []		* Bocumentation: https:// Last login: Fri Aug 17 09:4 ubunt@plan651:78 uptime 14:55:01 up 3 min. 1 user load average: 0.06, 0.10 , 0.05	* Bocumentation: https:// Last login: Mon Rug 20 14:5 ubuntu8plana72:"\$ uptime 14:55:01 up 3 min, 1 user load average: 0.07, 0.10 0.05	Last logar: Mon Hag 6 10:5 om 10.93,118,178 ubuntu@plans22:"\$ uptime 14:55:01 up 3 min, 1 user load awerage: 0.02, 0.06 0.04	Last login: Fn: Aug 24 00:3 18.10 ubuntuüplama29:"# uptime 14:55:01 up 18 days, 35 mi n, 1 usen, load average: 0,40, 0,21, 0,16 ubuntuüplama29:"# []	* Bocumentation: htt Last login: Tue Aug 7 ubuntufpland06:"4 upti 14:55:01 up 18 dags, n, 2 users, load ave 0.08, 0.17, 0.18 ubuntufpland06:"5 []
				ubuntu@plana61;"\$ uptime 14:55:01 up 3 min. 1 user	ubuntu@plana72:"\$ uptime 14:55:01 up 3 min. 1 user	14:55:01 up 6 min, 1 user , load average; 0.02, 0.06	n, 1 user, load average;	0.08, 0.17, 0.16 ubuntu@plana06;"\$ []
locumentation: https://	* Bossentation: https://b	* Boowertation: https://	* Bossesstation: https://b	, load average: 0.06, 0.10 , 0.05	, load average: 0.07, 0.10 , 0.05	ubuntuRplana22:"\$ [ubuntu@plana29:"\$ []	
Occumentation: https:// : login: Tue Jul 3 16:5 tusp] name5: "S uptime :95:01 up 18 days, 35 mi 1 user. load average:), 0,01-0,05	* Bocumentation: https://h Last login: Thu Aug 16 14:16 ubuntuRplana43:"\$ uptime 14:95:01 up 3 min. 1 user, load average: 0.07, 0.08,	* Bocumentation: https:// ubuntumplamas2: * uptime 14:25:01 up 3 min. 1 user load average: 0.02, 0.05 , 0.03	*Bocumentation: https://h Last login: Fri Jul 27 11:25 shoutsbylanable: Yes Lines 14:05:00 up 10 days, 25 min , 1 user, load warmage 0, 00, 001.05 days (25 down-bylanable) shoutsbylanable: 3	ubuntu@plana61:~\$ [ubuntu@plana72:~\$ [address for eth2: 10,214,14	65e x86,64)
95:01 up 18 days, 35 mi 1 user, load average:	14:55:01 up 3 min, 1 user, load average: 0.07, 0.08,	, load average: 0.02, 0.05 , 0.03	14:55:01 up 18 days, 35 min , 1 user, load average: 0.			Graph this data and manag m at https://landscape.capo	Graph this data and manag m at https://landscape.como Last login: Non Aug 13 10:3 on 10,39,118,19 ubuntumplama31:"\$ uptime 14:55:01 up 3 min, 1 upon load average: 0,28, 0,64 0,31	
ntukiplanu53:"\$ []	0.04 ubuntu@plana43:~\$ []	ubuntu@plane37:"\$ []	00, 0.01, 0.05 ubuntu@plana28:~\$ []			uraph this data and manag n at https://lendocape.com Lest login: Thu May 23 13:1 co 10,93,118,18 Leburtubplana50:"S uptime 14:95:01 up 3 min, 1 user load searcage: 0.14, 0.52 these the leadings: 0.15	Last login: Mon Aug 13 10:3 om 10.99,118,18	Last login; Fri Aug 24 ubuntu@plana07;"\$ upti
				* Bocumentation: https:// Last login: Non Aug 20 15:5 ubunt#plan#63:75 uptime 14:55:01 up 3 min. 1 user load average: 0.02, 0.04 , 0.03	" Documentation: https:// Last login: Tue Jul 3 14:3 ubuntu@plam74:"\$ uptime 14:55:01 up 3 min, 1 user , load average: 0.05, 0.12 , 0.05 ubuntu@plama74:"\$ []	ubuntuRplana30;"\$ uptime 14;55;01 up 3 min, 1 user	ubuntu@plana31;"\$ uptime 14:55;01 up 3 min, 1 user	* Bocumentation: htt Last login: Fri Aug 24 ubuntu@plana07:"\$ upti 14:55:01 up 15 min, rs, load average: 1.6 75, 0.32
				ubuntu@plana63:"\$ uptime 14*95:01 un 3 min 1 uper	ubuntu@plana74:"\$ uptime	, load average; 0,14, 0,52 , 0,16 ubuntuRolana30:"\$ ∏	, load average; 0,28, 0,64 , 0,31 ubuntu@plana31;"\$ []	75, 0,32 ubuntu@plana07;™S [
				, load average: 0.02, 0.04	load average: 0.05, 0.12	courtespraisov. 2 []	obuntumplanesi: "> []	
ocumentation: https://	* Documentation: https://h Last login: Fr: Bug 24 09/02 ubuntubplaned: fr: bug 24 09/02 ubuntubplaned: fr: butile 14:95/01 up 18 dess. 35 min , 7 upers. load average: 0 .10, 0.11, 0.13 ubuntubplaned: fr: 1 ubuntubplaned: fr: 1	"Botumentation: https:// ubuntu8plans84:"\$ uptime 14:55:01 up 3 min. 1 user , load average: 0.04, 0.07 , 0.04	* Bocumentation: https://h Last logn: fr: Jul 27 13:51 bountbplanac?'s but see 14:55:00 up 10 days, 25 min , 1 user, load seer age 0, 04, 0.05, 0,05 bountbplanac?'* □	ubuntu@plana63:~\$ [ubuntu@plana74:"\$ [3,2,0-26-generic x86_64) * Documentation; https://	* Tr	
ocumentation: https:// login: Fri Aug 24 13:1 tu8plana53:"\$ uptime 55:01 up 7:14, 2 user load average: 0.00, 0.0	ubuntu@plane41;"\$ uptime 14:55:01 up 18 deus, 35 min	14:55:01 up 3 min, 1 user load everyop: 0.04, 0.07	ubuntu@plana27:"\$ uptime 14:55:01 up 18 daus. 35 min			con/	* Rocumentation: https:// Last login: Sat Jul 28 18:1 uburtu/plana37:"5 uptime 14:99:01 up 3 min, 1 user load average: 0,02, 0,04	* Bocumentation; htt
100d average: 0,00, 0,0 0,05 ntusplana53;"# []	, 7 users, load average: 0 .10, 0.11, 0.13	, 0,04 ubuntu@plana84:~\$ [, 1 user, load average: 0. 04, 0.03, 0.05			om 10,99,118,54 ubuntuRolana32:"\$ uptime	14:95:01 up 3 min, 1 user load average: 0.02, 0.04	Last login: Hon Aug 20 ubuntu#plana12:"\$ upti
	ubuntu@plana41:"\$ [ubuntu@plana27;~% []	* Documentation: https://	* Bocumentation; https://	14:55:01 up 18 days, 35 mi n, 1 user, load average:	, 0.03 ubuntu@plana37:"\$ []	14:55:01 up 3 min, 1 , load average: 0.16,
				Last login: Fri Aug 24 13:2 ubuntu@plana57:"\$ uptiwe	ubuntuMplana75:"\$ uptime 14:55:01 up 3 min, 1 user	com/ Last login: Non Rug 6:10:4 cm 10:39:118,54 cbuntubplama32:75 uptime 14:95:01 up 18 days. 35 mi n. i user. load dwarage: 0.05, 0.03. 0.05 cbuntubplama32:75 []		ubuntu@plana12:"\$ upti 14:55:01 up 3 min, 1 load average: 0.16, 0.06 ubuntu@plana12:"\$ [
				*Bocumentation: https:// Last login: Fri Aug 24 13:2 ubuntubplaneS7:3 uptime 14:55:00 up 1:01, 1 user load average: 1.35, 1.55 .1.15 ubuntubplaneS7:75 []	* Documentation: https://dountumplana75:"5 uptime 14:95:00 up 3 min, 1 user, load average: 0.07, 0.09, 0.05 dountumplana75:"\$ []	×86_64)	New release '12,04 LTS' ava Run 'do-release-upgrade' to it.	
		Memory usage: 11% address for eth0: 10,214,133,33		ubuntu@plana57:~\$ []	acontoeptanans, + []		Run 'do-release-upgrade' to it.	ceph=00143-g6e952db x8
locumentation: https:// login: Tue Jul 10 21:0 tusplens05:"\$ uptime 55:01 up 3 min, 1 user oad average: 0,02, 0,07	" Bocumentation: https://h Last login: Fri Aug 17 18:33 ubuntuRplans42:"\$ uptime 14:55:01 up 3 ain, 1 user, load average: 0.15, 0.22,	Memory usage: 112 address for eth0: 10.214.133.33 Swap usage: 12 address for eth2: 10.214.14	"Bocumentation: https://h Lest login: Fri Aug 20 0952 ubomtubplandOS** uptime 14:95:00 up 10 days, 38 ain 4 upers, load average: 0 .00, 0.02, 0.05 ubomtubplandOS** []			* Documentation: https:// ubuntu.com/ Lest login: Fr: Aug 24 14:1 2012 From 10.99.118.178 ubuntub@lam364:% uptime 14:55:00 up 15 min, 1 use r, load average: 0.57, 0.4 7, 0.22	Last login: Tue Aug 7 13:3 ow 10.93.188.142 ubuntu@plans15:"\$ uptime 17:95:01 up 17 days, 23:27 , 1 user, load average: 0 ,00,0,01,0,05 ubuntu@plans15:"\$ []	* Notwentation: htt Last login: Thu Aug 23 18.18 ubuntu@plana08:"\$ upti 14:55:01 up 3 min, 1 , load average: 0.06, , 0.07
55:01 up 3 min, 1 user	ubuntumplana42: \$ uptime 14:55:01 up 3 min, 1 user,	Country and a date and a country	ubuntumplana26; % uptime 14:55:01 up 18 days, 36 min			ubuntugplana34:"\$ uptime	ubuntu@plana15:"\$ uptime	ubuntu@plana08:"\$ upti
1000 arenage: 0,02, 0,07 ,04 ntukplana50;*** []	0,11 ubuntu@plana42:"\$	Last login; Thu Aug 23 20;0	.00, 0.02, 0.05	* Bocumentation: https://	/Linux 3.6.0-rc2-ceph-00143 52db x86_64)	r, load average: 0.57, 0.4 7, 0.22	, 1 user, load average: 0 ,00, 0,01, 0,05	, load average; 0,06,
		ubuntu@plana83;"\$ uptime 14:95:01 up 49 daus, 5 min		Last login; Sun Jul 29 20;2 ubuntu@plana64;"\$ uptime		ubuntuRplana34:"\$ ■	ubuntu@plana15:"\$ [ubuntu@plana(8;"\$ [
		a of https://landcoper.cano Last logum: The May 25 20:0 on 10.99.1181. The May 25 20:0 on 10.99.1181. The total ubuntuplians85:75 uptime 14:55:01 up 49 days, 5 min , 1 user, load average; 0 .00, 0.05, 0.05 ubuntuplians85:101		* Bocumentation: https:// Last login; Sun Jul 29 20:2 ubuntuBplans64;"S uptime 14:95:01 up 3 min. 1 user load everage: 0.10, 0.10	* Documentation: https:// ubuntu.com/ ubuntu.com/ ubuntubplana76:"S uptime 14:95:01 up 3 min. 1 user load average: 0.04, 0.05 0.05	Graph this data and manag	ceph=00143=a6e952db x86_64)	ceph=00141-q532b65e x8
	remove with: ssh-keygen -f */home/tw			ubuntu@plana64:~\$ []	. load average: 0.04, 0.08	Graph this data and manag New release '12,04 LTS' ava Run 'dorreleaserupgrade' to	* Documentation: https://	* Bocumentation: htt
Occumentation: https://	ceph.com Password authentication is disabled to Keyboard-interactive authent	3,6,0+rc2+ceph=00143+g6e952 avoid man=	* Bocumentation: https://h		ubuntu@plana76:~\$	Last login: Thu Aug 9 11:0 ubuntu@plans88:"\$ uptime 14:55:01 up 102 days, 2:4 5, 1 usen, load swerage: 0,04,0,03,0,05	* Documentation: https:// Last login: Wed Aug 22 18:5 18,178	* Bocumentation: htt Last login: Fri Aug 24 18.178
: login; Fri Aug 24 06:0 itu8plana49;"\$ uptime	Keyboard-interactive authent ks.	* Bocumentation: https://	* Bocumentation: https://h Last login: Thu Jul 19 17:50 ubuntu@plana23: "\$ uptime 14:55:01 up 3 min, 1 user, load average: 0,07, 0,06,			ubuntukplana88:"\$ uptime 14:55:01 up 102 days, 2:4	Last login; Wed Hug 22 18;5 18,178 ubuntu@plans17;"\$ uptiwe 14:55:01 up 3 win, 1 user load average; 0.02, 0.04 ,0.03	Last login; Fri Hug 24 18.178 ubuntu@plana04:"\$ upti 14:55:01 up 15 min, r, load average: 4,24 0, 0,54
Occumentation: https:// t login: Fri Bug 24 06:0 tbuBplana49:"# uptime 55:01 up 16:58, 2 user load average: 0,00,0,0	Welcome to Ubuntu 12,04,1 LT	con/ con/ Last login; Tue Rug 14 18;5 on 10,93,118,10 ukuntu6plana82;"S uptime 14:95;01 up 3 min, 1 user load average: 0.02, 0.05	14:95:01 up 3 min, 1 user, load average: 0.07, 0.06,	* Bouwartstion: https://	* Boundariation: letters//	0, 1 user, 10ad average; 0,04, 0,03, 0,05 ubuntulkolana88:"\$ []	, 1080 average; 0,02, 0,04 , 0,03 ubuntu@olana17:"\$ []	r, 109d average; 4,24 0, 0,54 ubuntu@olana04:**\$ []
u.vo ntvAplana49;"\$ [* Bocumentation: https://h Last login: Fri Aug 24 14:17 ubuntuRplana85:"\$ uptime 14:95:01 up 3 min. 1 user, load average: 0.07, 0.13,	ubuntu#plana82; S uptime 14:95:01 up 3 min, 1 user	0,03 ubuntu@plana23:"\$ []	*Bocumentation: https:// Last logar: Mon Jul 30 06:4 ubuntukplann651*\$ uptime 14:55:00 up 3 min, 1 user loud deverage: 0.03. 0.07 .0.04 ubuntukplann65:*\$ []	* Bocumentation: https:// ubuntuBplana78:"\$ uptime 14:95:01 up 3 min. 1 user , load average: 0.03, 0.06 ,0.04 ubuntuBplana78:"\$ []	b65e x86.64)		
	14:55:01 up 3 min, 1 user,	. 0.03 ubuntu@planas2:"\$ []		14:95:01 up 3 min, 1 user load average: 0.03, 0.07	, load average: 0.03, 0.06 , 0.04		ceph=00143=g6e952db x96_64)	Run 'do-release-upgrad ade to it.
	0.06 ubuntu@plana36:~\$ []			, 0,04 ubuntu@plana65:~\$ []	ubuntuRplana78:"\$ []	buttu,cos/ Last login: Sun Jul 23 08:3 2012 From 10.99,118,162 churtulplans90:"5 uptime 14:95:01 up 1:33, 1 user load average: 0.04, 0.03	* Documentation: https:// Last login: Tue Jul 24 17:5 18,34 ubuntu@plana39:"\$ uptiwe	Last login; Thu Aug 16
						2012 from 10,99,118,162 ubuntu%plana90;"\$ uptime	18,34 ubuntu@plana39;"\$ uptime	2012 from 10,99,118,30 ubuntu@plana01;"\$ upti
locumentation; https://	* Bocumentation; https://h	* Bocumentation; https://	* Bocumentation; https://help. Last logic Man Suo 6 14:57:20			14:95:01 up 1:33, 1 user , load average: 0.04, 0.03	14:55:01 up 3 min, 1 user , load average: 0,03, 0,07	Last login: Thu Aug 18 2012 From 10,99,118,30 ubuntuSplama01;"\$ upti 14:95:01 up 187 days, 8, 2 users, load ave 0,00,001,005 ubuntuSplama01;"\$ []
Occumentation: https:// t login: Fri Aug 24 41:0 ttd@plans51:"S uptime 125:01 up 1 dag, 5:14, sprs. load average: 0, 0,15, 1,35 ttd@plans51:"S []	* Bocumentation: https://h Last login: Thu Jul 19 18:37 ubuntuRplana35:"\$ uptime 14:95:01 up 3 min, 1 user, load average: 0.04, 0.09.	*Bocumentation: https:// Last login: Hon Mug 20 15:1 ubuntuBplans81; *S uptime 14:95:01 up 3 min, 1 user . load average: 0.17, 0.18	* Bocumentation: https://help. Last login: Mon Aug 6 14:57:20 ubuntuAplana21:75 uptime 14:59:01 up 3 min, 1 user, lo ubuntuAplana21:75 []			ubuntu@plana90:~\$ []	. 0.04 ubuntukplana39:"\$ [ubuntu@plana01:"\$ []
sers, load average: 0. 0.15, 1.35	load average: 0,04, 0,09, 0,05 ubuntu@plana35:75 []		ubuntu#plana21:"\$ []	* Bocumentation: https:// Last login; Sat Jul 21 08;1 ubuntuBplansBi; Suptime 14;95;01 up 3 min. 1 user , load average; 0.10, 0.14	*Bocumentation: https:// Last login; Fri Jul 27 16;2 ubuntublama9475 uprime 14:95:01 up 18 days. 26 mi n, 1 user. load average: 0.01, 0.04, 0.05		2db x86_64)	3,4,0-ceph x86_64)
ntu@plana5i:″\$ []	ubuntu@plana35;"\$ [ubuntu@plane81:"\$ [14:95:01 up 3 min, 1 user load average; 0,10, 0,14	14:55:01 up 18 days, 36 mi n, 1 user, load average;	* Bocumentation: https:// Last login: Non Rug 20 01:1 ubuntuRplana13:"\$ uptime 14:95:01 up 3 min, 1 user , load average: 0.03, 0.06 , 0.04 ubuntuRplana13:"\$ []		* Bocumentation; htt
				, 0,06 ubuntu@plana66;~\$[]	0.01, 0.04, 0.05 ubuntu@plana94;~\$ []	ubuntu@planai3;"\$ uptime 14:55:01 up 3 min. 1 user	Last login; Wed Aug 22 17:5 ubuntuRolana14:"\$ uptime	Last login; Thu Aug 16
						. load average: 0.03, 0.06	14:55:01 up 3 min, 1 user load average: 0.14, 0.12	ubuntu@plana05:"\$ upti 17:55:01 up 17 days.
	3,6,0-nc2-ceph-00143-g6e952	3,6,0-rc2-ceph-00143-g6e952	File Hosts Send	Help		ubuntu@plana13:~\$ [* Bocumentation: https:// Last login: Wed Aug 22 17:5 ubuntuMplams14:75 uptime 14:95:01 up 3 win. 1 user . load average: 0.14, 0.12 , 0.06 ubuntuMplams14:75 []	conv login: Thu Aug II on 10.99.118.198 ubuntu@plana05:"5 upt 17:95:01 up 17 days. , 1 user, load aveno ,00,0,20.05 ubuntu@plana05:"\$ []
Documentation: https:// ntu8plana48:"\$ uptime :55:01 up 3 min. 1 user load average: 0.02, 0.04	* Documentation: https://	* Documentation: https://			Swap usage: 0% ddress for eth2: 10.214,146			
	com* Lest login; Med Pay 15 18:1 on 10,93,118.134 bountabplaneSC:"\$ uptime 14:55:01 up 44 min, 1 upe 14:55:01 up 44 min, 1 upe 15 log sorrage: 0,00,0,0 6 description: 10,00,0 bountabplaneSC:"\$ []	Last login; Med Aug 1 06:4 on 10.93.118.6 on the Median 70.00 continue		* Bocumentation: https:// Last login; Hon Aug 13 17:2 ubuntuBplans65; "\$ uptime 14:95:01 up 3 min, 1 user load average: 0.29, 0.21	Graph this data and manag	3,5,0-rc5-ceph-00183-g14240 * Documentation: https://	3,6,0-rc2-ceph-00143-g6e952 * Documentation: https://	3,6,0-rc2-ceph-00140-s * Documentation: htt
ntu6plana48:″\$ []	ubuntu@planaCC:"\$ uptime 14:55:01 up 44 min, 1 use	om 10.98.118.6 ubuntuRplama79:"\$ uptime 14:55:01 up 3 min, 1 uper , load average: 0.05, 0.09 , 0.05		14:95:01 up 3 min, 1 user	oraph runs data and manag m at https://landcaapp.camo Last login; Wed Hug 22 19:5 cm 10.99.118.18 dbuntuBplanna55:% uptime 14:95:00 up 44 min, 1 use r. load average: 0,00, 0.1 2.082	com/		con/
	r, load average: 0.00, 0.0 6, 0.46	, load average: 0.05, 0.09 , 0.05		, 0,09 ubuntu@plana68;"\$ []	ubuntu@plana95;"\$ uptime 14:55:01 up 44 min. 1 use	on 10,39,118,18 uhuntuRolana71="% untire	CONV Last login: Fri Aug 17 16:3 om 10.39.118.74 uhuntu@lana#0:"\$ uetime	on 10,214,131,14
	ubuntu@plana92;~* []	ubuntu@plana79;~\$ [r, load average: 0,00, 0,1 2, 0,82	14:55:01 up 18 days, 35 mi	14:55:01 up 3 min, 1 user , load average: 0.06, 0.12	com/ Last login: Thu Aug 23 on 10.214.131.14 ubuntu@plana02:"\$ upti 14:55:01 up 1 dag, 4 1 user, load avenage 0, 0.01, 0.22
			[0 tv@dreamer ~]\$ jobs		ubuntu@plana95:~\$ uptime[]	com/ com/ com/ com/ com/ com/ com/ com/	om 10,99,118,74 ubuntu6plans40:"\$ uptime 14:55:01 up 3 min, 1 user , load average: 0.06, 0.12 , 0.05 ubuntu6plans40:"\$ []	0, 0.01, 0.22 ubuntu@plana(2:"\$ []
Documentation: https://			[1]+ Running	cs			3.5.0-m5-maph-00212-o7F77h	
Bocumentation: https:// it login: Mon Jul 2 17:3 ntudplane47:"% uptime 155:01 up 3 min, 1 user load average: 0.03, 0.07	"Bocumentation: https:// ubuntu6plans91:"% uptime 14:55:01 up 44 min, 1 use r, load average: 0.00, 0.1 0, 0,77	* Bocumentation: https:// serverguide/C	sh plana & [0 tv@dreamer ~]\$ scrot	* Bocumentation: https:// Last login; Fri Rug 17 09:5 ubuntuBplaneS7:5 uptime 14:95:01 up 3 min, 1 user , load avenage: 0.29, 0.51	* Bocumentation: https:// Last login: Fri Aug 24 14:4 ubuntu@plana%6:"% uptime 14:95:01 up 1:33, 1 usen , load average: 0.04, 0.03		* December of the balance of	ceph=00140-g938838c x8f
	r, load average: 0.00, 0.1 0, 0.77 ubuntu@plana91:"\$ []	serverguide/C New release "12.04 LTS" ava Run "domneleasemupghade" to	2	ubuntu@plana67;"\$ uptime 14:95:01 up 3 min, 1 user	ubuntu@plana96;"\$ uptime 14:55:01 up 1:33, 1 user	* Documentation: https:// Last login: Wed Aug 15 10:4 ubuntu@planal9:"% uptime 14:55:01 up 3 min, 1 user , load average: 0.03, 0.06	Lost login: Fin Jul 27 11:2 om 10,39,118.14 ubuntu@plana33:"% uptime 14:55:01 up 18 days, 35 mi n, 1 usen, load average: 0.03, 0.02, 0.05	* Bocumentation: htt Last login: Fri Aug 24 18.30
),04 untu@plana47;~\$ []	usuntcuspienasi; % []	Last login; Thu Jul 19 17;2 ubuntumplana77;"\$ uptime 14;55:01 up 18 days, 36 ms n. 1 user, load marroes;		, load average; 0,29, 0,51 , 0,24 ubuntu@plana67;"5 []	, load average; 0,04, 0,03 , 0,05 ubuntu@plana96;"\$ []	14:55:01 up 3 min, 1 user , load average: 0.03, 0.06	om 10,39,118,14 ubuntu@plana33:"\$ uptime	
		14:95:01 up 18 days, 36 mi		gouttrabianasi; a []	coontoxpranteb; 5 []	, 0.04 ubuntuRplana19:"\$ [n, 1 user, load average;	14:55:01 up 1 day, 4 1 user, load average

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mkcephfs



mkcephfs walkthrough

- say "[osd.42] host = mysrv1"
- setup ssh
- put ceph.conf on every node
- create dirs, mount data disks
- sudo mkcephfs -a
 - -c /etc/ceph/ceph.conf
 - -k ceph.keyring
- service ceph -a start

mkcephfs limitations

- can't grow
- can't shrink
- can't upgrade
- can't handle errors
- lots of shell → hard to maintain

sysvinit limitations

all daemons managed by the same script can't respawn pid files

legacy

support for running in source checkout support for scping the binary ssh from an init script "service ceph ssh"? support for mkfs & mount of btrfs command for deleting logs

legacy

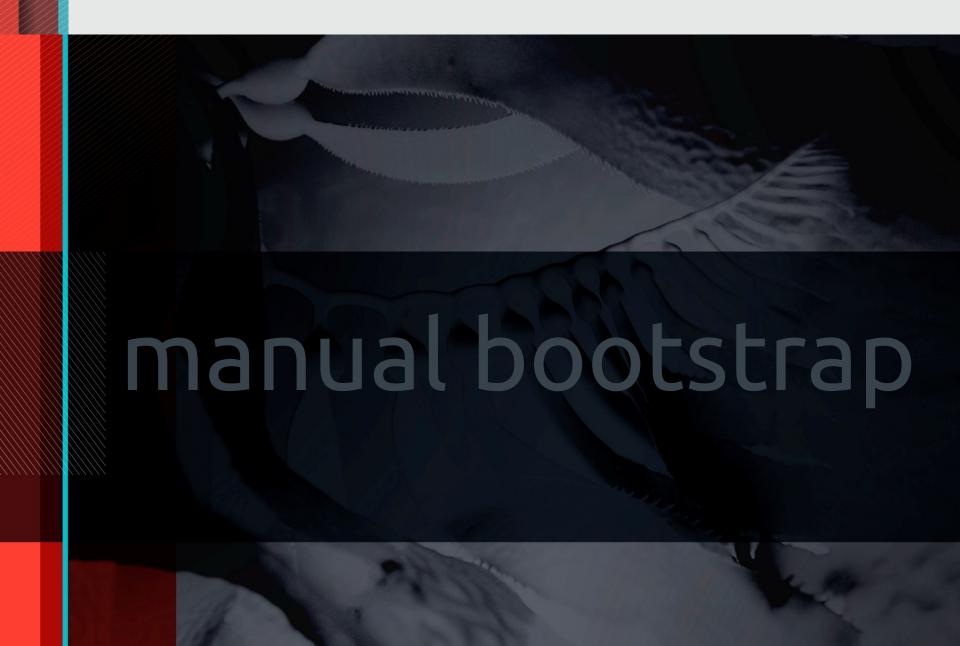
```
wc -l src/mkcephfs.in
src/ceph_common.sh

520 src/mkcephfs.in
158 src/ceph_common.sh
678 total
```

legacy

```
cat src/init-ceph.in
src/ceph_common.sh | wc -l
516
wc -l /etc/init.d/*|grep -v
total|sort -n|tail -3
   314 /etc/init.d/openvpn
   338 /etc/init.d/rc
   533 /etc/init.d/openipmi
```

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manual bootstrap

roughly what mkcephfs does underneath (modernized for presentation)

showing all options on command line so you can see information flow; normally would use ceph.conf

create a keyring and monitor key

```
$ ceph-authtool \
  --create-keyring --gen-key \
  -- name=mon. mon.keyring
creating mon.keyring
$ cat mon.keyring
[mon.]
key = AQBaBThQcLhpLBAANhkkqZ70d23I94xIt80F9A==
```

create admin key

```
$ ceph-authtool --gen-key
  --name=client.admin --set-uid=0 \
  --cap mon "allow *" \
  --cap osd "allow *" \
  --cap mds "allow" \
  mon.keyring
$ cat mon.keyring
[mon.]
key = AQBaBThQcLhpLBAANhkkqZ70d23I94xIt80F9A==
[client.admin]
key = AQDqBThQcC94FRAA0aUlHAD2IuM/OQdVQIs5ZQ==
auid = 0
caps mds = "allow"
caps mon = "allow *"
caps osd = "allow *"
```

create a monitor

```
# unique id to identify the whole cluster
$ uuidgen
e946cafc-2b52-4858-8cf0-db4619481f72
# note keyring, fsid, and the address where
# the monitor will listen, for use in the
 generated monitor map.
$ ceph-mon -i a --mkfs --keyring mon.keyring \
  -m 10.1.2.3:6789 --mon-data /dev/mon.a/ \
  --fsid e946cafc-2b52-4858-8cf0-db4619481f72
# start it
$ ceph-mon -i a --mon-data /dev/mon.a/ \
  --public-addr 10.1.2.3:6789 \
  --auth-supported cephx
```

test the monitor

```
$ ceph -m 10.1.2.3:6789 \
   --keyring mon.keyring \
   --auth-supported cephx \
   -s
```

allocate a storage daemon

```
# allocate osd id; uuids can be used for
# idempotency and avoiding waste of
# numbers on errors
$ uuidgen
1199be1c-2ecd-4e25-80c0-107209b05673
$ ceph -m 10.1.2.3:6789 \
  --keyring mon.keyring \
  --auth-supported cephx \
  osd create --concise \
  1199be1c-2ecd-4e25-80c0-107209b05673
42
```

create a storage daemon

```
# also create a key
$ ceph-osd \
  -m 10.1.2.3:6789 \
  --osd-data /media/osd42/ \
  --osd-journal /media/osd42/journal \
  --osd-journal-size 2000 \
  -- osd-uuid 1199be1c-2ecd-4e25-80c0-107209b05673 \
  --fsid e946cafc-2b52-4858-8cf0-db4619481f72 \
  -i 42 --mkfs --mkkey
```

authorize the osd key

```
# add the key to the monitor's key
# store, with the right permissions
$ ceph -m 10.1.2.3:6789 \
  --keyring mon.keyring \
  --auth-supported cephx \
  auth add osd.42 \
  osd 'allow *' \
  mon 'allow rwx' \
  -i /media/osd42/keyring
```

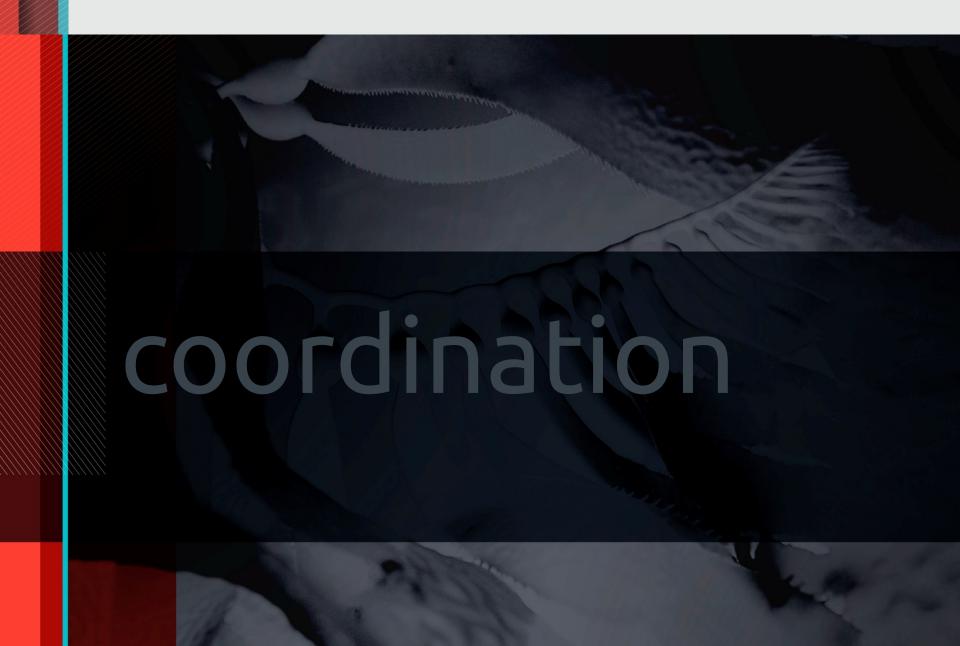
set the crush location

```
$ ceph -m 10.1.2.3:6789 \
  --auth-supported cephx \
  --keyring /media/osd42/keyring \
  --name osd.42 \
  osd crush create-or-move \
  42 \
              ← osd id
            ← initial weight
  host=mysrv05 \
  rack=rack07 \
  dc=us-west
```

start the storage daemon

```
$ ceph-osd \
 -m 10.1.2.3:6789 \
 --auth-supported cephx \
 --osd-data /media/osd42/ \
 --osd-journal /media/osd42/journal \
 -i 42
```

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monitors use paxos

majority vote about everything that needs consensus

quorum needs

2 of 3

3 of 5

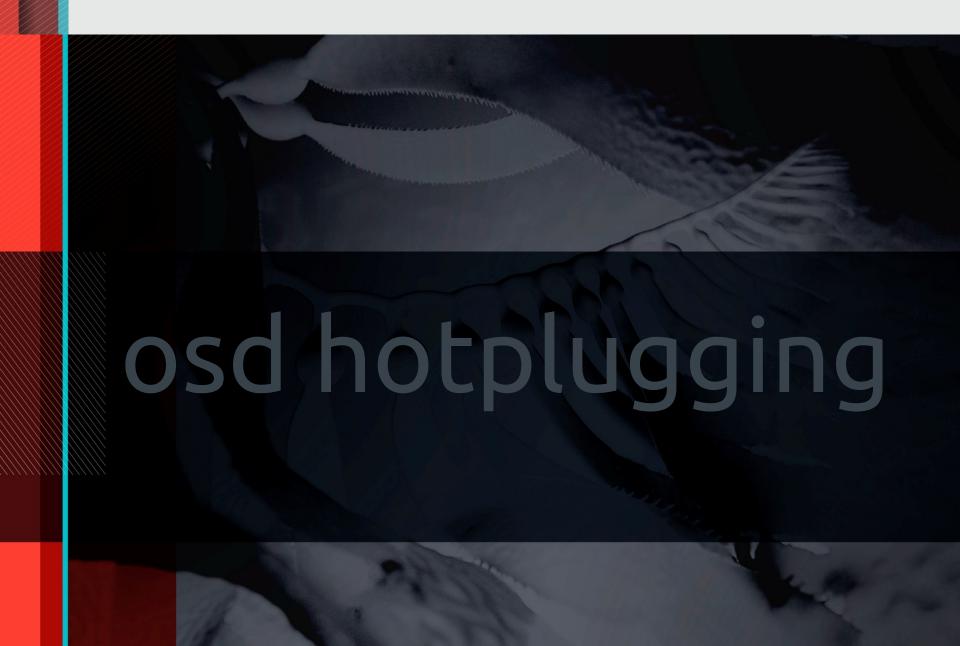
4 of 7

initial quorum

```
mon_initial_members =
host1, host2, host3
```

majority of these needed to form the quorum for the very first time

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systematic, devops, angle

focus on admin needs (would love to hear more from you!)

better integration, automation, industrial strength shrinkwrap

strong conventions for paths etc

ceph core remains as flexible as ever, deployment packaging has assumptions; you can always create your own packaging

disk failure

eject old one
pick new from the replacement pile
plug it in

when failure percentage is above a threshold, bring a cart full of spare disks and visually scan the rack for blinking lights

fan/psu/mobo/etc fails

just redistribute disks to any server that has slots free

fix/replace the server at leisure

the server is just a chassis for data

re-replication will also handle it, but see old tale about station wagon full of tapes

implications

osd id not tied to a server anymore might as well move away from humans managing osd ids cluster uuid, osd uuids keep us safe; still need id for dense array in CRUSH

ceph-disk-prepare

\$ ceph-disk-prepare /dev/sdg

erases all data on that disk!
creates GPT partition with c3ff05d uuid
creates a file system
stores cluster uuid, osd uuid on disk

ceph-disk-activate

```
$ ceph-disk-activate /path/to/osd/data
$ ceph-disk-activate --mount /dev/sdg1
(mount in temp directory)
allocate osd id, if needed
create ceph-osd & authorize its key, if n.
move mount point to /var/lib/ceph/osd
tell upstart to start the service
```

udev

kernel sees a block device, triggers udev upstart monitors udev events upstart runs ceph-disk-activate when partition with uuid c3ff05d is added

upstart

current implementation is tied to upstart design is not; core ceph is not we'll support more once the need is there

good stuff in upstart

no pid files, no double-fork needed respawn on crash log stderr until custom log system starts instance jobs lets us run several daemons dynamically, no compromises

using upstart

```
$ initctl list | grep ceph
$ initctl status ceph-osd id=42
$ stop ceph-osd id=42
$ initctl status \
ceph-osd cluster=foo id=42
```

bootstrap keys

how to create a new osd?

need to talk to monitor

need to make monitor trust us

create client.bootstrap-osd key that is allowed to allocate osd id, add key with the capabilities an osd needs

teach a computer to fish

capa-what?

capabilities; what that key can do

```
[client.admin]
key = AQDqBThQcC94FRAA0aUlHAD2IuM/OQdVQIs5ZQ==
auid = 0
caps mds = "allow"
caps mon = "allow *"
caps osd = "allow *"
[client.bootstrap-osd]
caps mon = "allow command osd create ...; \
  allow command osd crush set ...; \
  allow command auth add *↓
    osd allow\\ * 4
    mon allow\\ rwx; \
  allow command mon getmap"
```

say what?

intricate nesting and delicate whitespace (sorry)

```
caps mon = "
allow command osd create ... ← any number of args
allow command osd crush set ...
allow command auth add *↓
    osd allow\ *↓ ← one level less quoting
    mon allow\ rwx
allow command mon getmap
"
```

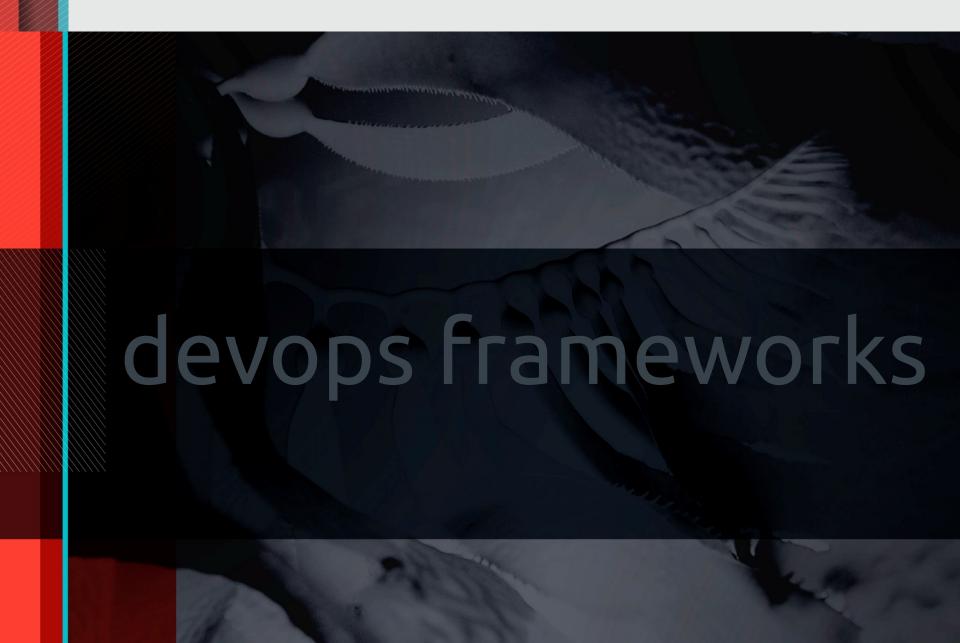
example:

```
auth add ANYONEWORD ← like, "osd.42" osd "allow *" mon "allow rwx"
```

do they speak english in what?

i do hope we visit this some time but for now, it works simple case is simple, complex case is tedious

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chef

ruby framework, you describe steps to take with pseudo-declarative helpers to create files etc

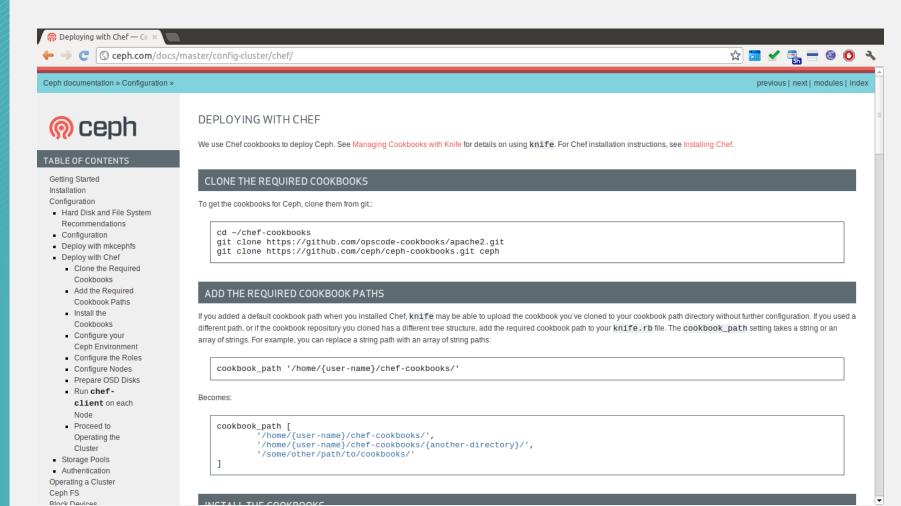
json data about node fetched from server at beginning of run

searches via solr/lucene, fetch other node's json data:
role:ceph-mon AND chef_environment:#{node.chef_environment}

json data saved to server at end of successful run run every 30 min, or when told to

awkward to bring up distributed systems from scratch; a needs to save attributes, and only then b can search for them, and even then the search updates asynchronously

chef



cooking squid

to add an osd node:

```
assign node to right environment
  set crush location of server
  add role ceph-osd
to remove a node:
  chef really doesn't handle this well
  shift the data out
  shut down the daemon
  zap the disk
  remove the osd from monitors
```

crowbar

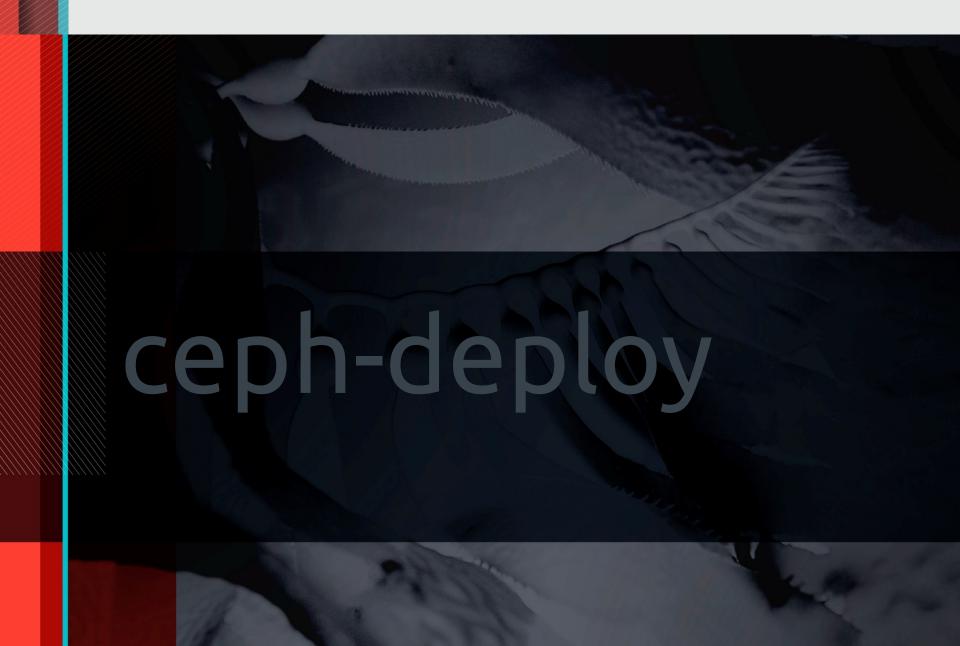
bare-metal deploy system on top of chef quite different from chef in functionality still managing to reuse code from our standalone chef cookbook, 4 if is_crowbar?

puppet

if you squint hard enough, looks somewhat like chef

currently community contributions only

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there is no spoon

we don't want to force users to use chef (or any of the alternatives) just ssh and python libraries on the admin workstation

no dorodango

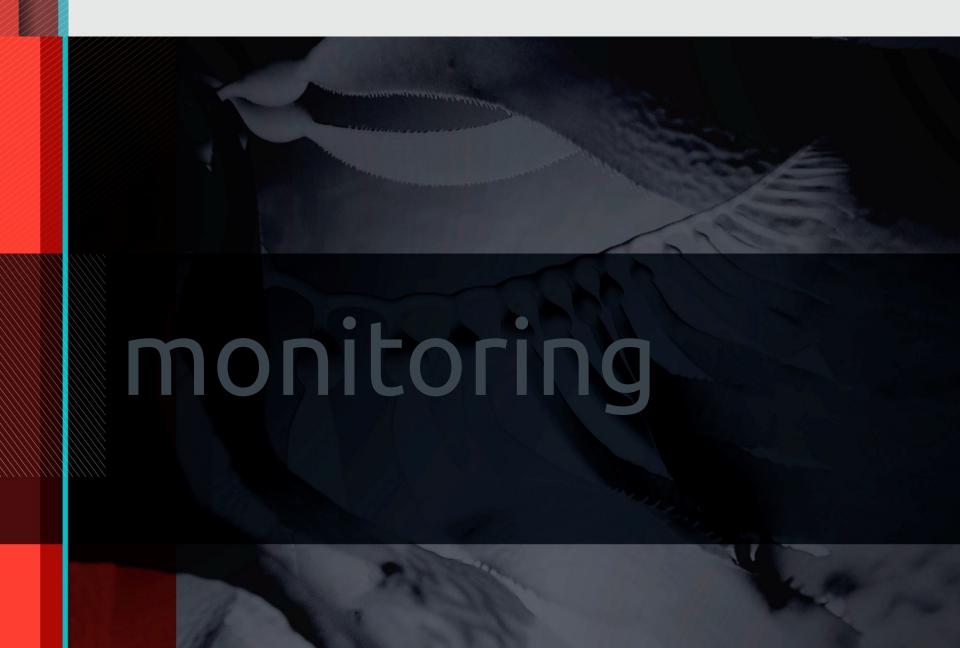
deploy logic is put into ceph, not the recipes or such wrappers makes cookbooks simpler, too



demo (he says, hope in his eyes)

```
ceph-deploy new n01 n02
ceph-deploy install n01 n02
ceph-deploy mon
ssh n01 sudo ceph -s
ceph-deploy osd n02
ceph-deploy disk n02:vdb n02:vdc
```

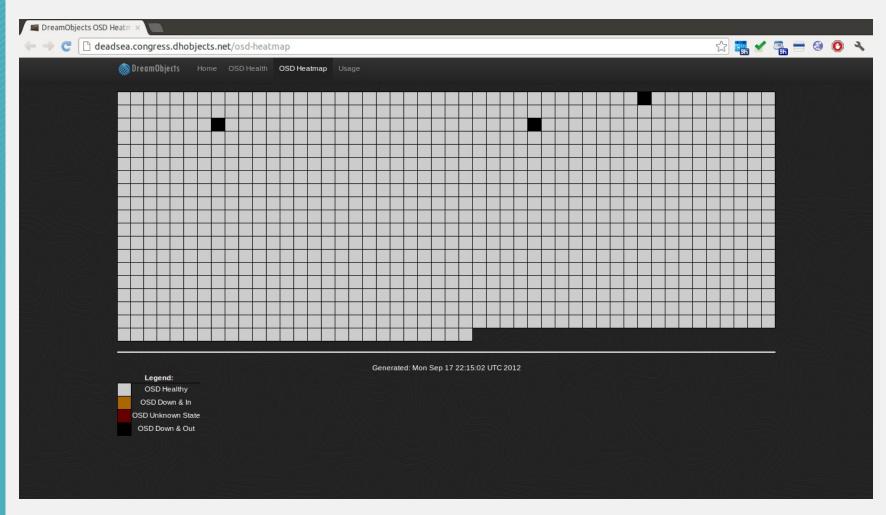
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nagios et al

ceph health

DreamObjects



not always a clean fail

things you know to measure are easy to detect; slow ops etc

for the rest, you need an imprecise test

smoke test

radosbench s3-tests for radosgw, lb, apache working on modularizing teuthology (our test runner) to make test cases more self-contained

benchmark

before and after a change

logging

logstash



kibana



structured logging

metrics

DreamObjects



perf counters as metrics

admin socket

ceph --admin-daemon /var/run/ceph/ceph-osd.0.asok perf dump

```
"throttle-msgr_dispatch_throttler-client" : {
    "get_or_fail_fail" : 0,
    "get_sum" : 82760,
    "max" : 104857600,
    "put" : 2637,
    "val" : 0,
    "take" : 0,
    "get_or_fail_success" : 0,
    "wait" : {
        "avgcount" : 0,
        "sum" : 0
    },
    "get" : 2637,
    "take_sum" : 0,
    "put_sum" : 82760
}
```

extract metrics from logs

Logster etc structured logging will help a lot

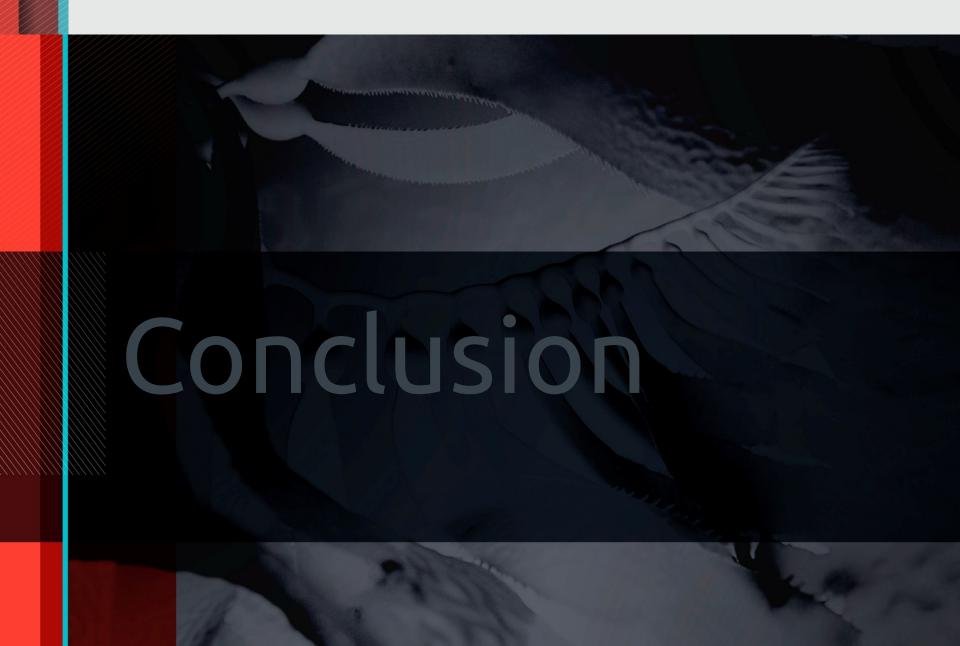
collecting metrics

statsd graphite bucky

collectd

more integration coming

inktank



ceph is hard

so far from status quo not a lamp stack not just client-server

ceph is easy

so far from status quo we can change the product, not just packaging: mon initial members uuids ceph osd create bootstrap keys high availability is in base design

devops like you mean it

e.g. ceph osd crush create-or-move will probably go into C++ once we're comfortable with it

developers without borders

Thank you

Questions?

Credits

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Photo of dorodango by Kelly Taylor, CC BY-SA 2.0 http://www.flickr.com/photos/wmshc_kiwitayro/663355489/

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