Fast Iteration Tools in The Production of The Talos Principle

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GAME DEVELOPERS CONFERENCE[™]EUROPE congress-centrum ost koelnmesse · cologne, germany august 3-4, 2015



- 20 years in existing...
- a dozen of top-ranking games...
- ...only 25 people at most













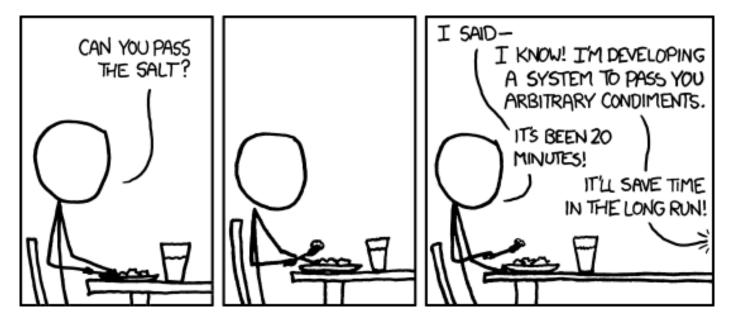


It's the mindset that matters...

- Will demonstrate how the tools are used
- Won't explain the implementation
 - The approach is more important







(c) Randall Munroe xkcd.com





A staged example...







How to report a bug?

- Write it down on paper?
- Alt-Tab into a bug reporting app?
- Fact: Writing bug reports is long, boring and distracting.

So bugs don't get reported Can we improve on that?







"World Bugs System"

- Reporting inside the "game world"
- Press one key & type short description
- <10 seconds. Literally.
- Automatically stores position.







Build Monitor

- "Continuous integration" status
 - Builds
 - Integrations
 - Automated tests
- Central place to install fresh tools

	BuildMonitor/index.html				∀ C ⁱ Q, Search
state	4 14:04:41				
Status					
Branch:	Version:	Host:	Current Status	Latest Build	
Talos_Android_dev	Dev-Windows	builder01	2015-07-24 04:52:50 (9h 11m ago) DONE @242701	2015-07-24 04:52:50 (9h 11m ago) SETUP @242701	
Talos_Android_dev	Talos-Android-Final	builder02	2015-07-24 10:21:05 (3h 43m ago) DONE @242701	2015-07-24 10:21:05 (3h 43m ago) SETUP @242701	
Talos_Android_dev	[integration]	odin	2015-05-26 13:51:28 (59d 0h 12m ago) DONE @231761	N/A	
Talos_Android_distro	Talos-Android-Final	builder14	2015-07-24 05:37:44 (8h 26m ago) DONE @237086	2015-07-24 05:37:44 (8h 26m ago) SETUP @237086	
Talos_Android_distro	[integration]	odin	2015-05-26 14:01:42 (59d 0h 2m ago) DONE @231826	N/A	
AutoTest	Talos_PC_dev-Talos-Windows-Final	tester01	2015-07-24 14:00:00 (4m ago) testing @244382	2015-07-24 08:57:51 (5h 6m ago) NO SETUP @244364	
Talos_PC_dev	Dev-Windows	builder06	2015-07-24 13:41:55 (22m ago) DONE @244382	2015-07-24 13:41:55 (22m ago) SETUP @244382	
Talos_PC_dev	Talos-Android-Final	builder15	2015-07-24 14:01:20 (2m ago) DONE @244382	2015-07-24 14:01:20 (2m ago) SETUP @244382	
Talos_PC_dev	Talos-PS4	builder03	2015-07-24 13:40:57 (23m ago) building @244382	2015-07-24 05:31:49 (8h 32m ago) SETUP @244364	
Talos_PC_dev	Talos-Windows-Final	buider07	2015-07-24 13:58:52 (Sm ago) DONE @244382	2015-07-24 13:58:52 (Sm ago) SETUP @244382	
Talos_PC_dev	Talos_Executables-Linux-Final	builderi02	2015-07-24 13:42:21 (21m ago) DONE @244382	2015-07-24 13:42:21 (21m ago) SETUP @244382	
Talos_PC_dev	Talos_Executables-OSX-Final	builderm01.croteam	2015-07-24 13:41:49 (22m ago) DONE @244382	2015-07-24 13:41:49 (22m ago) SETUP @244382	
Talos_PC_dev	[integration]	odin	2015-06-11 17:19:23 (42d 20h 44m ago) DONE @236344	N/A	
AutoTest	Talos PC distro-Talos-Windows-Final	tester01	2015-07-24 09:22:32 (4h 41m ago) DONE @244372	2015-07-24 09:22:32 (4h 41m ago) NO SETUP @244372	
Talos PC distro	Talos-Windows-Final	builder14	2015-07-23 20:52:31 (17h 11m app) DONE @244372	2015-07-23 20:52:31 (17h 11m ago) SETUP @244372	
Talos PC distro	Talos Executables-Linux-Final	builder/02	2015-07-23 20:22:06 (17h 42m ago) DONE @244372	2015-07-23 20:22:06 (17h 42m ago) SETUP @244372	
Talos PC distro	Talos Executables-OSX-Final	builderm01.croteam	2015-07-23 20:22:27 (17h 4tm ago) DONE @244372	2015-07-23 20:22:27 (17h 41m ago) SETUP @244372	
Talos PC distro	[integration]	odin	2015-06-15 10:18:35 (39d 3h 45m ago) DONE @232862	N/A	
Sam3_PS3_dev	Dev-Windows	huider12	2015-07-24 00:10:22 (13h 53m ago) DONE @222698	2015-07-24 00:10:22 (13h 53m ago) SETUP @222698	
5am3 PS3 dev	SeriousSam3-PS3	builder13	2015-07-24 01:20:27 (12h 43m ago) DONE @222698	2015-07-24 01:20:27 (12h 43m ago) SETUP @222698	
Talos PS4 dev	Dev-Windows	builder01	2015-07-24 05:08:37 (8h 55m ago) DONE @244273	2015-07-24 05:08:37 (8h 55m ago) SETUP @244273	
Talos_PS4_dev	Tabs-PS4	buider04	2015-07-24 05:06:57 (of 55m ago) DONE @244273	2013-07-24 05106137 (on 55m ago) 3ETUP @244273 2015-07-24 05:24:22 (bh 39m ago) SETUP @244273	Legend:
Talos PS4_dev	[integration]	odin	2015-06-12 (5:24122 (61 399 ago) DONE @2791273 2015-06-12 (5:24132 (41d 22h 399 ago) DONE @237103	N/A	done .
dev Sam3 PC	Dev-Windows	builder11	2015-06-12 15124132 (418 221 391 ago) DONE @257105 2015-07-24 07:08:22 (6h 55m ago) DONE @243884	10/A 2015-07-24 07:08:22 (6h 55m ago) SETUP @243884	building, previous build passed
dev_Sam3_PC	SeriousSam3-Windows-Final	buider09	2015-07-24 0708122 (61 55m ago) D'ONE @27-3007 2015-07-24 01:58:54 (12h 5m ago) D'ONE @243884	2015-07-24 01:58:54 (12h 5m ago) SETUP @243884	building, previous build failed
uev_sans_rc	Senoussants-windows-Filai	builderog			failed, buoxy2 fixed, not vet started b
dev_Sam3_PC	SeriousSam3_Executables-Linux-Final	builder/02	2015-07-24 02:40:10 (11h 24m ago) FAILED @243884 8ug42876 suspects:	2015-07-24 01:38:43 (12h 25m ago) SETUP @243884	failed, bugXYZ assigned, not yet fixed
dev_Sam3_PC	SeriousSam3_Executables-OSX-Final	builderm01.croteam	2015-07-24 04:07:00 (9h 57m ago) DONE @243884	2015-07-24 04:07:00 (9h 57m ago) SETUP @243884	failed or blocked
distro_Sam3_PC	SeriousSam3-Windows-Final	builder09	2015-07-24 04:47:46 (9h 16m ago) DONE @233112	2015-07-24 04:47:46 (9h 16m ago) SETUP @233112	
distro_Sam3_PC	SeriousSam3_Executables-Linux-Final	builder/02	2015-07-24 04:08:30 (9h 55m ago) DONE @233112	2015-07-24 04:08:30 (9h 55m ago) SETUP @233112	
distro_Sam3_PC	SeriousSam3_Executables-OSX-Final	builderm01.croteam	2015-07-24 03:32:06 (10h 32m ago) DONE @233112	2015-07-24 03:32:06 (10h 32m ago) SETUP @233112	
dev_Sam3_Xenon	SeriousSam3-Xenon	builder07	2015-07-24 01:09:51 (12h 54m ago) DONE @210160	2015-07-24 01:09:51 (12h 54m ago) SETUP @210160	
distro_Sam3_Xenon	SeriousSam3-Xenon	builder10	2015-07-24 06:12:22 (7h Stm ago) DONE @210165	2015-07-24 06:12:22 (7h S1m ago) SETUP @210165	
distro SamHDTFE Win32	SeriousSamHD-Win32 Final	builder07	2015-07-23 23:35:04 (14h 29m ago) DONE @237488	2015-07-23 23:35:04 (14h 29m ago) SETUP @237488	
distro SamHDTSE Win32	SeriousSamHD TSE-Win32 Final	builder01	2015-07-24 01:13:32 (12h 50m ago) DONE @243217	2015-07-24 01:13:32 (12h 50m ago) SETUP @243217	
main	Dev-Windows	builder12	2015-07-24 11:25:01 (2h 39m ago) DONE @244378	2015-07-24 11:25:01 (2h 39m ago) SETUP @244378	
main	SeriousSam3-Android-Final	builder03	2015-07-24 00:02/38 (14h tm ago) FAILED @244286 Bug42875	N/A	
main	SeriousSam3-PS3	builder02	FAILED FOR TOO LONG - FIX ASAPIII	N/A	
main	SeriousSam3-Windows-Final	builder10	2015-07-24 13:51:05 (13m ago) building @244378	N/A	
main	SeriousSam3-Xenon	builder08	FAILED FOR TOO LONG - FIX ASAPIII	N/A	
main	SeriousSam3 Executables-Linux-Final		2015-07-24 11:25:57 (2h 38m ago) DONE @244378	2015-07-24 11:25:57 (2h 38m ago) SETUP @244378	
main	SeriousSamHD_TSE-Xenon	builder08	FAILED FOR TOO LONG - FIX ASAPIII	N/A	
main	Talos-Android-Final	builder08 builder13	2015-07-24 11:59:53 (2h 4m ago) DONE @244378	N/A 2015-07-24 11:59:53 (2h 4m ago) SETUP @244378	
	Talos-Android-Final Talos-PS3	builder05		2015-07-24 11:59:53 (2h 4m ago) <u>5E:TUP</u> @244.378 N/A	
main			FAILED FOR TOO LONG - FIX ASAPIII		
main	Talos-PS4	builder11	FAILED FOR TOO LONG - FIX ASAPIII	N/A	
main	Talos-Windows-Final	builder06	2015-07-24 12:15:29 (1h 49m ago) FAILED @244376 Bug42888	N/A	
main	Talos-Xenon	builder05	FAILED FOR TOO LONG - FIX ASAPIII	N/A	
main	Talos_Executables-Linux-Final	builderi02	2015-07-24 11:27:38 (2h 37m ago) DONE @244378	2015-07-24 11:27:38 (2h 37m ago) SETUP @244378	
main	Talos_Executables-OSX-Final	builderm01.croteam	2015-07-24 11:26:07 (2h 38m ago) DONE @244378	2015-07-24 11:26:07 (2h 38m ago) SETUP @244378	





244414	2015-07-27 11:14:52 (4h 17m ago)		 	main-Talos_Executables-Linux-Final-builder102 DONE <u>SETUP</u> (buildtime: 2m)
244414	2015-07-27 11:12:44 (4h 19m ago)			main-Talos_Executables-OSX-Final-builderm01.croteam.local DONE SETUP (buildtime: 2m)
244414	2015-07-27 11:12:33 (4h 19m ago)			main-Dev-Windows-builder12 DONE <u>SETUP</u> (buildtime: 1m)
244414	2015-07-27 11:12:15 (4h 20m ago)			main-SeriousSam3_Executables-Linux-Final-builderIO2 DONE <u>SETUP</u> (buildtime: 1m)
<u>244414</u>	2015-07-27 11:09:52 (4h 22m ago)	robert.sajko	1	o Gatekeeper now stores marked changes in a text file, to provide an equivalent of 'integration memory' from the script-based o 2015-07-27 09:09:52Z robert.sajko Settings: normal;
244413	2015-07-27 11:05:48 (4h 26m ago)		 	Talos_PC_dev-Talos-PS4-builder03 DONE <u>SETUP</u> (buildtime: 1h 1m)
244413	2015-07-27 10:41:33 (4h 50m ago)		 	Talos_PC_dev-Dev-Windows-builder06 DONE <u>SETUP</u> (buildtime: 0m)
244413	2015-07-27 10:26:33 (5h 5m ago)		 	Talos_PC_dev-Talos-Android-Final-builder15 DONE <u>SETUP</u> (buildtime: 22m)
244413	2015-07-27 10:06:27 (5h 25m ago)		 	Talos_PC_dev-Talos_Executables-Linux-Final-builderIO2 DONE SETUP (buildtime: 2m)
244413	2015-07-27 10:06:26 (5h 25m ago)		 	Talos_PC_dev-Talos_Executables-OSX-Final-builderm01.croteam.local DONE SETUP (buildtime: 2m)
<u>244413</u>	2015-07-27 10:02:57 (5h 29m ago)	goran.adrinek	1	o Fixed problems in Gehenna dialogs caused by freeing the admin before freeing anyone else: now you will be locked out of Ge o 2015-07-27 08:02:57Z goran.adrinek Settings: normal; Talos_Android_distro:integrate, Talos_PC_distro:integrate, Talos_PS4
244411	2015-07-27 11:53:40 (3h 38m ago)			main-Talos-Windows-Final-builder06 DONE <u>SETUP</u> (buildtime: 1h 10m)
244411	2015-07-27 10:16:03 (5h 16m ago)			main-Talos-Android-Final-builder13 DONE <u>SETUP</u> (buildtime: 29m)
244411	2015-07-27 09:49:39 (5h 42m ago)			main-SeriousSam3_Executables-Linux-Final-builderIO2 DONE SETUP (buildtime: 1m)
244411	2015-07-27 09:48:11 (5h 44m ago)			main-Dev-Windows-builder12 DONE <u>SETUP</u> (buildtime: 1m)
244411	2015-07-27 09:47:30 (5h 45m ago)			main-Talos_Executables-OSX-Final-builderm01.croteam.local DONE SETUP (buildtime: 2m)
244411	2015-07-27 09:46:34 (5h 46m ago)			main-Talos_Executables-Linux-Final-builder102 DONE SETUP (buildtime: 1m)
<u>244411</u>	2015-07-27 09:44:53 (5h 47m ago)	robert.sajko	1	o WIP: Gatekeeper no longer sets flags on changelists for AIS daemon to pick up and integrate. Instead, all integrations on gat clicking Integrate. Changelist selection is preserved when refreshing the UI, e.g. when submitting a manual integration which r o 2015-07-27 07:44:52Z robert.sajko Settings: normal;
244410	2015-07-27 10:39:37 (4h 53m ago)			main-Talos-Windows-Final-builder06 DONE <u>SETUP</u> (buildtime: 1h 9m)
244410	2015-07-27 09:59:49 (5h 32m ago)		 	main-SeriousSam3-Windows-Final-builder10 FAILED @244410 Bug42900
244410	2015-07-27 09:39:33 (5h 53m ago)		 	main-Talos-Android-Final-builder13 DONE <u>SETUP</u> (buildtime: 29m)
244410	2015-07-27 09:13:28 (6h 19m ago)			main-Talos_Executables-Linux-Final-builder102 DONE <u>SETUP</u> (buildtime: 2m)
244410	2015-07-27 09:11:14 (6h 21m ago)			main-Talos_Executables-OSX-Final-builderm01.croteam.local DONE SETUP (buildtime: 2m)
244410	2015-07-27 09:10:36 (6h 21m ago)			main-SeriousSam3_Executables-Linux-Final-builderIO2 DONE <u>SETUP</u> (buildtime: 1m)
244410	2015-07-27 09:10:23 (6h 22m ago)		 	main-Dev-Windows-builder12 DONE <u>SETUP</u> (buildtime: 1m)
<u>244410</u>	2015-07-27 09:08:05 (6h 24m ago)	helena.hunski	1	o Compressed blend mask Stain02.tex. o 2015-07-27 07:05:28Z helena.hunski Settings: normal;
<u>244408</u>	2015-07-27 05:30:45 (10h 1m ago)	nathan.brown	1	o Added source files to EditKit_Base VS project. o 2015-07-27 03:30:35Z nathan.brown Settings: normal;

Talos_Android_dev	Talos-Android-Final	builder02	2015-07-15 06:38:01 (8h 11m ago) DONE @242701	2015-07-15 06:38:01 (8h 11m ago) <u>SETUP</u> @242701
Talos_Android_dev	[integration]	odin	2015-05-26 13:51:28 (50d 0h 57m ago) DONE @231761	N/A
Talos_Android_distro	Talos-Android-Final	builder14	2015-07-15 05:46:16 (9h 2m ago) DONE @237086	2015-07-15 05:46:16 (9h 2m ago) SETUP @237086
Talos_Android_distro	[integration]	odin	2015-05-26 14:01:42 (50d 0h 47m ago) DONE @231826	N/A
AutoTest	Talos_PC_dev-Talos-Windows-Final	tester01	2015-07-15 14:38:02 (11m ago) testing @243742	2015-07-15 14:04:21 (44m ago) NO SETUP @243734
Talos_PC_dev	Dev-Windows	builder06	2015-07-15 14:01:43 (47m ago) DONE @243742	2015-07-15 14:01:43 (47m (go) <u>SETUP</u> @24B742
Talos_PC_dev	Talos-Android-Final	builder15	2015-07-15 14:37:11 (11m ago) DONE @243742	2015-07-15 14:37:11 (11m ago) <u>SET OF</u> @243742
Talos_PC_dev	Talos-PS4	builder03	2015-07-15 14:45:35 (3m ago) building @243742	2015-07-15 14:43:00 (6m ago) <u>SETUP</u> @243734
Talos_PC_dev	Talos-Windows-Final	builder07	2015-07-15 14:36:28 (12m ago) DONE @243742	2015-07-15 14:36:28 (12m ago) <u>SETUP</u> @243742
Talos_PC_dev	Talos_Executables-Linux-Final	builderl02	2015-07-15 14:02:33 (46m ago) DONE @243742	2015-07-15 14:02:33 (46m ago) <u>SETUP</u> @243742
Talos_PC_dev	Talos_Executables-OSX-Final	builderm01.croteam	2015-07-15 14:02:50 (46m ago) DONE @243742	2015-07-15 14:02:50 (46m ago) SETUP @243742
Talos_PC_dev	[integration]	odin	2015-06-11 17:19:23 (33d 21h 29m ago) DONE @236344	N/A
AutoTest	Talos_PC_distro-Talos- Windows-Final	tester01	2015-07-15 01:14:32 (13h 34m ago) FAILED @243663 Bug42770 suspects:	2015-07-15 00:24:35 (14h 24m ago) NO SETUP @243663
Talos_PC_distro	Talos-Windows-Final	builder14	2015-07-14 16:11:33 (22h 37m ago) DONE @243663	2015-07-14 16:11:33 (22h 37m ago) <u>SETUP</u> @243663
Talos_PC_distro	Talos_Executables-Linux-Final	builderl02	2015-07-14 15:44:03 (23h 5m ago) DONE @243663	2015-07-14 15:44:03 (23h 5m ago) <u>SETUP</u> @243663
Talos_PC_distro	Talos_Executables-OSX-Final	builderm01.croteam	2015-07-14 15:41:59 (23h 7m ago) DONE @243663	2015-07-14 15:41:59 (23h 7m ago) <u>SETUP</u> @243663
Talos_PC_distro	[integration]	odin	2015-06-15 10:18:35 (30d 4h 30m ago) DONE @232862	N/A
Sam3_PS3_dev	Dev-Windows	builder12	2015-07-15 00:10:55 (14h 38m ago) DONE @222698	2015-07-15 00:10:55 (14h 38m ago) <u>SETUP</u> @222698
Sam3_PS3_dev	SeriousSam3-PS3	builder13	2015-07-15 01:19:24 (13h 29m ago) DONE @222698	2015-07-15 01:19:24 (13h 29m ago) <u>SETUP</u> @222698
Talos_PS4_dev	Dev-Windows	builder01	2015-07-15 12:51:57 (1h 57m ago) DONE @243736	2015-07-15 12:51:57 (1h 57m ago) <u>SETUP</u> @243736
Talos_PS4_dev	Talos-PS4	builder04	2015-07-15 13:32:51 (1h 16m ago) building @243736	2015-07-15 13:31:21 (1h 17m ago) SETUP @243731
Talos_PS4_dev	[integration]	odin	2015-06-12 15:24:32 (32d 23h 24m ago) DONE @237103	N/A
dev_Sam3_PC	Dev-Windows	builder11	2015-07-15 07:20:18 (7h 28m ago) DONE @232992	2015-07-15 07:20:18 (7h 28m ago) <u>SETUP</u> @232992
dev_Sam3_PC	SeriousSam3-Windows-Final	builder09	2015-07-15 06:08:15 (8h 41m ago) DONE @232992	2015-07-15 06:08:15 (8h 41m ago) <u>SETUP</u> @232992
dev_Sam3_PC	SeriousSam3_Executables- Linux-Final	builderl02	2015-07-15 03:42:57 (11h 6m ago) DONE @232992	2015-07-15 03:42:57 (11h 6m ago) <u>SETUP</u> @232992
dev_Sam3_PC	SeriousSam3_Executables- OSX-Final	builderm01.croteam	2015-07-15 04:15:13 (10h 34m ago) DONE @232992	2015-07-15 04:15:13 (10h 34m ago) <u>SETUP</u> @232992
distro_Sam3_PC	SeriousSam3-Windows-Final	builder09	2015-07-15 02:04:36 (12h 44m ago) building @233112	2015-07-14 04:51:57 (1d 9h 57m ago) <u>SETUP</u> @233112
distro_Sam3_PC	SeriousSam3_Executables- Linux-Final	builderl02	2015-07-15 04:12:54 (10h 36m ago) DONE @233112	2015-07-15 04:12:54 (10h 36m ago) <u>SETUP</u> @233112
distro_Sam3_PC	SeriousSam3_Executables- OSX-Final	builderm01.croteam	2015-07-15 03:37:21 (11h 11m ago) DONE @233112	2015-07-15 03:37:21 (11h 11m ago) <u>SETUP</u> @233112
dev_Sam3_Xenon	SeriousSam3-Xenon	builder07	2015-07-15 01:31:01 (13h 18m ago) DONE @210160	2015-07-15 01:31:01 (13h 18m ago) <u>SETUP</u> @210160
distro_Sam3_Xenon	SeriousSam3-Xenon	builder10	2015-07-15 06:08:11 (8h 41m ago) DONE @210165	2015-07-15 06:08:11 (8h 41m ago) <u>SETUP</u> @210165

Legend: done building, pre building, pr failed, bugx building failed, <u>bugy</u> failed or blo

building @244531	2015-07-28 10:34:48 (3m ago) <u>SETUP</u> @244527						
) DONE @244527	2015-07-28 10:25:04 (13m ago) <u>SETUP</u> @244527						
building @244531	2015-07-28 10:23:36 (14m ago) SETUP @244527						
	e 3 - Developer install - Talos_PC_dev Setup						
mago) FAILED							
Im ago) DONE (Choose Instal	der in which to install Serious Engine 3 - Developer install -						
Talos PC dev							
- FIX ASAPIII							
	Ill Serious Engine 3 - Developer install - Talos_PC_dev in the following folder. To						
ago) DONE @2 install in a diffe ago) DONE @22 installation.	install in a different folder, click Browse and select another folder. Click Install to start the installation.						
ago) DONE @24							
go) DONE @244							
13m ago) DONE							
ago) DONE @24	evious build passed						
ago) DONE @24	evious build failed						
ago) DONE @24 D:\Work\T	alos_PC_dev\ Browse KYZ fixed, not yet st						
90) DONE @24:	<u>YYZ</u> assigned, not ye						
ago) DONE @23 Space required	t: 128.0MB						
ago) DONE @23 Space availabl	e: 1636.4GB 🔍 Get Latest Version						
ago) FAILED @ Nullsoft Install Sy	stem v2.46						
- FIX ASAP!!!	Install Cancel						
ago) DONE @21							
- FIX ASAP!!!	N/A						
ago) DONE @243217	2015-07-28 01:15:21 (9h 22m ago) <u>SETUP</u> @243217						
) DONE @244530	2015-07-28 10:28:05 (10m ago) <u>SETUP</u> @244530						



Content Editor

- central hub for 90% of editing needs
 - in-place editing of meshes, shaders, animations, scripts...
 - in-editor play-testing
- drastically shortens content iteration time
- still using external programs for character animation, texture editing etc.







GPU-based GI solver

- GI ray-tracing using GPU for processing
- Instead of hours, light baking takes minutes
- Runs on separate "baker" machines
 - Developer can work on something else meanwhile
 - Only need a few super-beefy GPUs
- Implementing this one actually *is* a bit involved
 - perhaps in another talk





5 minutes later...







Talos_Android_dev	Talos-Android-Final	builder02	2015-07-15 06:38:01 (8h 11m ago) DONE @242701	2015-07-15 06:38:01 (8h 11m ago) <u>SETUP</u> @242701
Talos_Android_dev	[integration]	odin	2015-05-26 13:51:28 (50d 0h 57m ago) DONE @231761	N/A
Talos_Android_distro	Talos-Android-Final	builder14	2015-07-15 05:46:16 (9h 2m ago) DONE @237086	2015-07-15 05:46:16 (9h 2m ago) <u>SETUP</u> @237086
Talos_Android_distro	[integration]	odin	2015-05-26 14:01:42 (50d 0h 47m ago) DONE @231826	N/A
AutoTest	Talos_PC_dev-Talos-Windows-Final	tester01	2015-07-15 14:38:02 (11m ago) testing @243742	2015-07-15 14:04:21 (44m ago) NO SETUP @243734
Talos_PC_dev	Dev-Windows	builder06	2015-07-15 14:01:43 (47m ago) DONE @243742	2015-07-15 14:01:43 (47m ago) <u>SETUP</u> @243742
Talos_PC_dev	Talos-Android-Final	builder15	2015-07-15 14:37:11 (11m ago) DONE @243742	2015-07-15 14:37:11 (11m ago) <u>SETUP</u> @243742
Talos_PC_dev	Talos-PS4	builder03	2015-07-15 14:45:35 (3m ago) building @243742	2015-07-15 14:43:00 (6m ago) SETUP @243734
Talos_PC_dev	Talos-Windows-Final	builder07	2015-07-15 14:36:28 (12m ago) DONE @243742	2015-07-15 14:36:28 (12m ago) <u>SETUP</u> @243742
Talos_PC_dev	Talos_Executables-Linux-Final	builderl02	2015-07-15 14:02:33 (46m ago) DONE @243742	2015-07-15 14:02:33 (46m ago) <u>SETUP</u> @243742
Talos_PC_dev	Talos_Executables-OSX-Final	builderm01.croteam	2015-07-15 14:02:50 (46m ago) DONE @243742	2015-07-15 14:02:50 (46m ago) <u>SETUP</u> @243742
Talos_PC_dev	[integration]	odin	2015-06-11 17:19:23 (33d 21h 29m ago) DONE @236344	N/A
AutoTest	Talos_PC_distro-Talos- Windows-Final	tester01	2015-07-15 01:14:32 (13h 34m ago) FAILED @243663 Bug42770 suspects:	2015-07-15 00:24:35 (14h 24m ago) NO SETUP @243663
Talos PC distro	Talos-Windows-Final	builder14	2015-07-14 16:11:33 (22h 37m ago) DONE @243663	2015-07-14 16:11:33 (22h 37m ago) SETUP @243663
Talos_PC_distro	Talos_Executables-Linux-Final	builderl02	2015-07-14 15:44:03 (23h 5m ago) DONE @243663	2015-07-14 15:44:03 (23h 5m ago) <u>SETUP</u> @243663
Talos_PC_distro	Talos_Executables-OSX-Final	builderm01.croteam	2015-07-14 15:41:59 (23h 7m ago) DONE @243663	2015-07-14 15:41:59 (23h 7m ago) <u>SETUP</u> @243663
Talos_PC_distro	[integration]	odin	2015-06-15 10:18:35 (30d 4h 30m ago) DONE @232862	N/A
Sam3_PS3_dev	Dev-Windows	builder12	2015-07-15 00:10:55 (14h 38m ago) DONE @222698	2015-07-15 00:10:55 (14h 38m ago) <u>SETUP</u> @222698
Sam3_PS3_dev	SeriousSam3-PS3	builder13	2015-07-15 01:19:24 (13h 29m ago) DONE @222698	2015-07-15 01:19:24 (13h 29m ago) <u>SETUP</u> @222698
Talos_PS4_dev	Dev-Windows	builder01	2015-07-15 12:51:57 (1h 57m ago) DONE @243736	2015-07-15 12:51:57 (1h 57m ago) <u>SETUP</u> @243736
Talos_PS4_dev	Talos-PS4	builder04	2015-07-15 13:32:51 (1h 16m ago) building @243736	2015-07-15 13:31:21 (1h 17m ago) <u>SETUP</u> @243731
Talos_PS4_dev	[integration]	odin	2015-06-12 15:24:32 (32d 23h 24m ago) DONE @237103	N/A
dev_Sam3_PC	Dev-Windows	builder11	2015-07-15 07:20:18 (7h 28m ago) DONE @232992	2015-07-15 07:20:18 (7h 28m ago) <u>SETUP</u> @232992
dev_Sam3_PC	SeriousSam3-Windows-Final	builder09	2015-07-15 06:08:15 (8h 41m ago) DONE @232992	2015-07-15 06:08:15 (8h 41m ago) <u>SETUP</u> @232992
dev_Sam3_PC	SeriousSam3_Executables- Linux-Final	builderl02	2015-07-15 03:42:57 (11h 6m ago) DONE @232992	2015-07-15 03:42:57 (11h 6m ago) <u>SETUP</u> @232992
dev_Sam3_PC	SeriousSam3_Executables- OSX-Final	builderm01.croteam	2015-07-15 04:15:13 (10h 34m ago) DONE @232992	2015-07-15 04:15:13 (10h 34m ago) <u>SETUP</u> @232992
distro_Sam3_PC	SeriousSam3-Windows-Final	builder09	2015-07-15 02:04:36 (12h 44m ago) building @233112	2015-07-14 04:51:57 (1d 9h 57m ago) <u>SETUP</u> @233112
distro_Sam3_PC	SeriousSam3_Executables- Linux-Final	builderl02	2015-07-15 04:12:54 (10h 36m ago) DONE @233112	2015-07-15 04:12:54 (10h 36m ago) <u>SETUP</u> @233112
distro_Sam3_PC	SeriousSam3_Executables- OSX-Final	builderm01.croteam	2015-07-15 03:37:21 (11h 11m ago) DONE @233112	2015-07-15 03:37:21 (11h 11m ago) <u>SETUP</u> @233112
dev_Sam3_Xenon	SeriousSam3-Xenon	builder07	2015-07-15 01:31:01 (13h 18m ago) DONE @210160	2015-07-15 01:31:01 (13h 18m ago) <u>SETUP</u> @210160
distro_Sam3_Xenon	SeriousSam3-Xenon	builder10	2015-07-15 06:08:11 (8h 41m ago) DONE @210165	2015-07-15 06:08:11 (8h 41m ago) <u>SETUP</u> @210165

Legend: done building, pr building, pr failed, bugx building failed, <u>bugy</u> failed or blo



Automated Testing

- Bot can play the game start-to-end
- Can't prove that there are no bugs
- Can prove that the game can be completed
- But wait it gets even better...







Super-fast Automated Testing

- Human tester needs 10 hours
- Bot does it in 4 hours of game time
- FFWD mode completed in 20 minutes
- Submit-to-tested **<1 hour**!
- equivalent of >15,000 hours of human testing total – about 8 years of full day testing





Resolving the conflicting goals

- This wasn't implemented in one go
- Long chain of gradual improvements
 - avoid doing a lot at once
 - each small step must do something useful
 - carry over between projects





Rationale

- Long term savings in time
- Menial tasks should be done by machines
 - repeatability
 - •avoids human errors
 - avoids frustration ⇒ happy developers
 - humans concentrate on design and decisions
- Always more to do





Thanks!

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