Wildfire Games and 0 A.D.

Working with an international team on a Free software project

avanade

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2. Technical details
3. Choosing a scripting language
4. Versioning
5. Bug tracking
6. Contribution management
7. Continuous integration
8. Funding
9. Legal

0 A.D., a free software RTS game

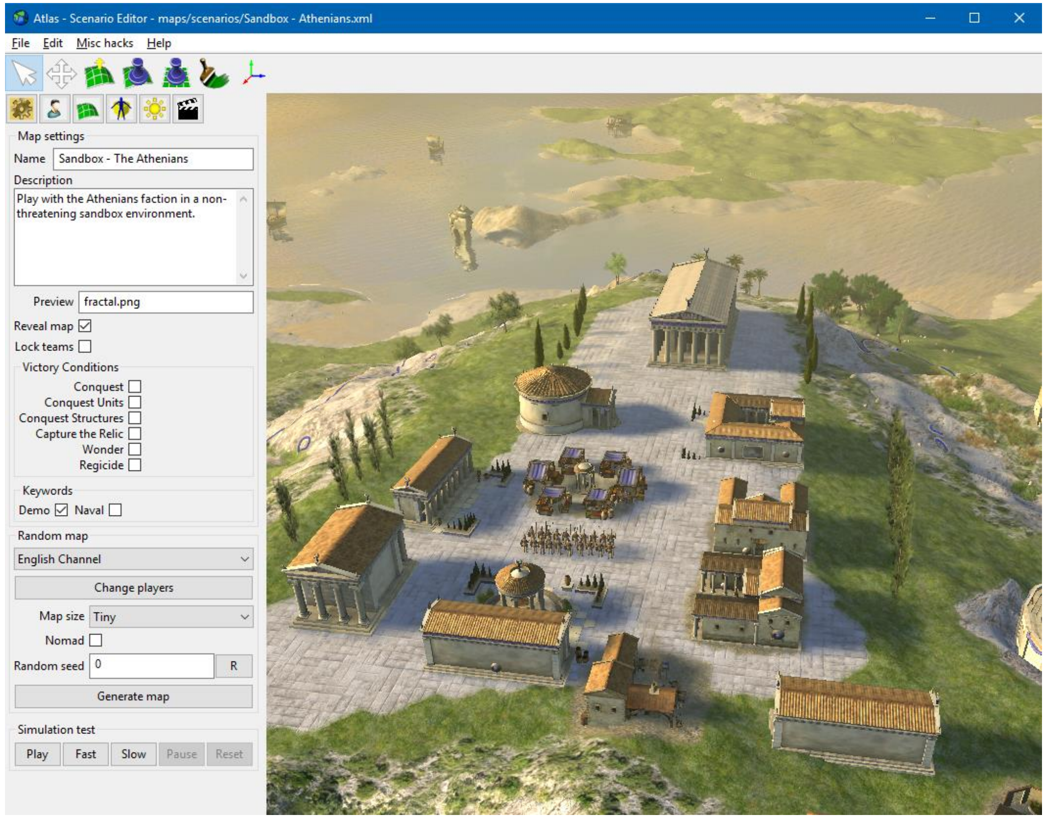
Features

Game presentation

Technical details

Features

- Real Time Strategy Game
  - 5 combinable game modes (32 modes!)
  - Single player mode
  - LAN and WAN Multiplayer mode (STUN servers for easy configuration on WAN)
  - Random / Procedural map generation in JavaScript
  - 90 % of the displayed text is translated in more than 20 languages
  - Multiplayer lobby with 1v1 rating
  - Map Editor
  - Anonymous opt-in feedback
  - High quality visuals compared to most open source games.
  - An entirely moddable engine (mod.io)


Atlas - Scenario Editor - maps/scenarios/Sandbox - Athenians.xml

Map settings

Name: Sandbox - The Athenians

Description: Play with the Athenians faction in a non-threatening sandbox environment.

Preview: fractal.png

Reveal map ☑

Lock teams □

Victory Conditions

Conquest □

Conquest Units □

Conquest Structures □

Capture the Relic □

Wonder □

Regicide □

Keywords

Demo ☑ Naval □

Random map

English Channel

Map size: Tiny

Nomad □

Random seed: 0

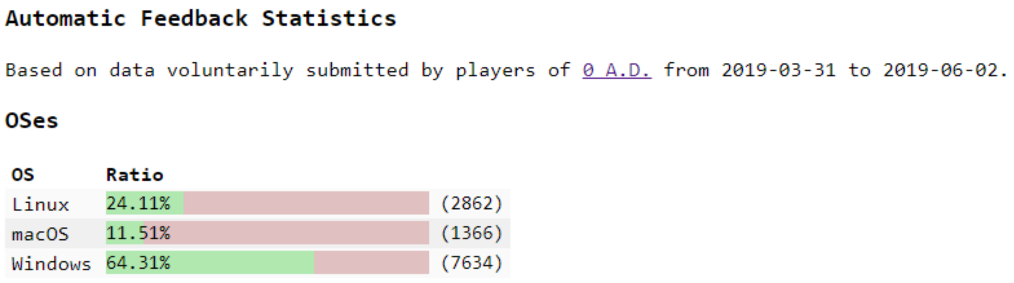
Simulation test

Game presentation

- Started in 2001 by Microsoft Age of Empires AOK fans.
    - Originally created the « Rome at War » mod which one of the most popular to that day
- Was made Open Source in 2009
- Last version Alpha 23b : Ken Wood (24th version) (23 Dec. 2018)
- Mac / Linux / Windows (x86)
    - Partially functional Android & iOS builds
    - Works on Raspberry Pi 4 (ARM)

Game presentation

- 100k multiplayer accounts 10k used every month
- Between 60 and 120 lobby players online simultaneously in the evening
- 250k total downloads in 2018 + Downloads from Linux Package Manager



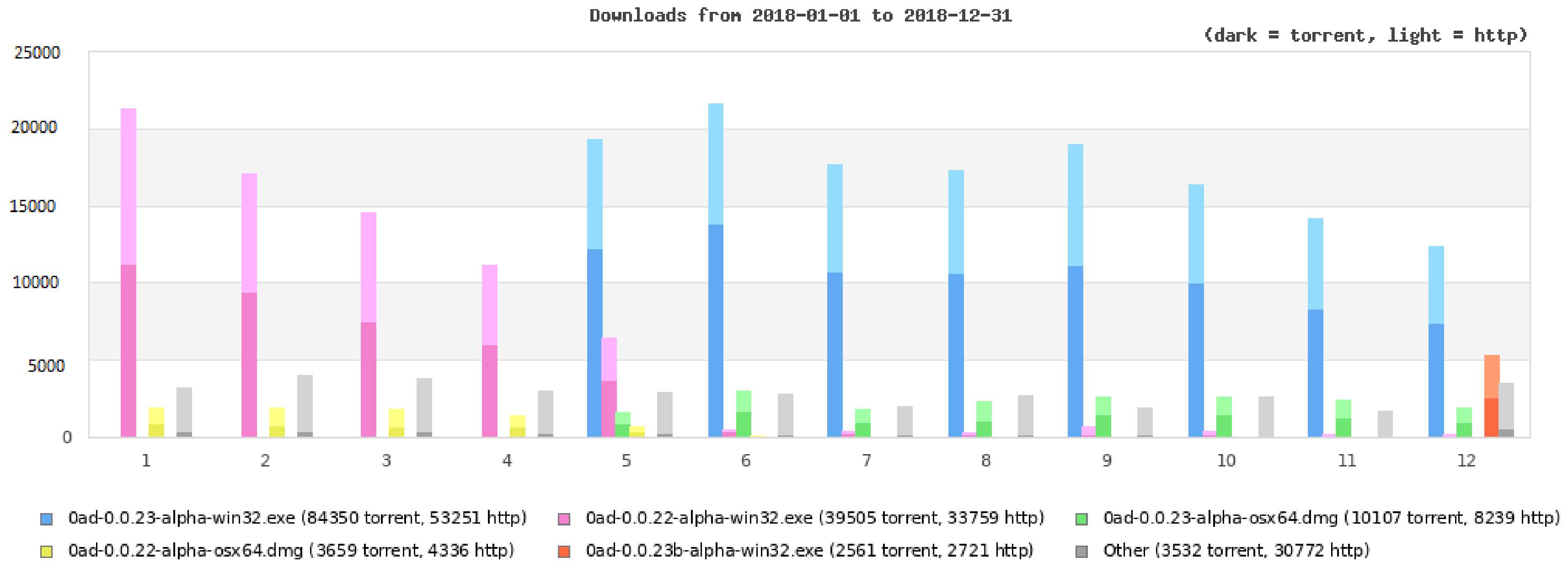
Automatic Feedback Statistics

Based on data voluntarily submitted by players of 0 A.D. from 2019-03-31 to 2019-06-02.

OSes

OS	Ratio	
Linux	24.11%	(2862)
macOS	11.51%	(1366)
Windows	64.31%	(7634)

https://feedback.wildfiregames.com/results/



https://releases.wildfiregames.com/stats.php

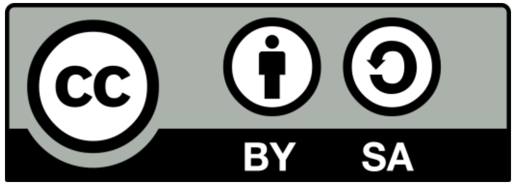
The team

- Since 2000:
  - 200+ Wildfire Games staff members.
  - 500+ external contributors.
- Currently:
  - About 30 staff members (15 Nationalities)
  - 10+ active external contributors + Modders

https://team.wildfiregames.com/

License

- FLOSS means Free/Libre and Open Source Software
- 0 A.D. is under CC BY SA 3.0 Unported license for art and GPL V2+ for code + MIT + BSD licenses



Technical Details

General

Third party libraries

Why JavaScript

General

- Homegrown game engine
- Game Languages:
  - C++
  - JavaScript
- Art assets: XML/JSON
- Tools Perl/Python
- Build LUA (Premake)
- Multiplayer chat XMPP
- (Translation) PO files (transifex.com)
- OpenGL 2.0, GLSL 1.10 / OpenGL 1.0, ARB Shaders

XMPP

moz://a

Third party libraries

- Boost
- Enet
- Gloox (XMPP)
- Iconv
- ICU
- libcurl
- Libpng
- Libsodium
- Libxml2
- Miniupnpc
- OpenAL
- Vorbis
- Wxwidgets
- NVTT
- zlib
- Fcollada
- SpiderMonkey
- SDL 2
- MikkTspace
- GRPC (Futur)

JFrog | CONAN C/C++ package manager

Choosing a scripting language

Choice Criteria

Lua vs JavaScript

Conclusion

Choice Criteria

- Backend functionality (from the Scripting Backend Functionality thread)FSMs:
  - Multiple script contexts
  - Ability to get/set a script variable value from within the engine.
  - Global variables are properties of the "global" object.
  - Ability to call script functions from the engine.
  - Ability to call engine functions from the script.
- Frontend functionality
  - Data types: int, float, string, Boolean, custom objects, null const, array
  - Data features: automatic conversion, basic types (no double, unsigned etc.), strong OOP
  - Other features: File Inclusion, Math library, Error handling, Regex
- Data Structures:
  - Ability to create variables, arrays, and objects
  - Ability to expose complex engine data structures and classes (possibly with a custom interface).
- General:
  - Ability to pause scripts during execution and, later, resume them.
  - Ability to restrict access to any unsafe features of the scripting language, if applicable: File I/O, network access, system diagnostic, etc.
  - Overall speed

Why JavaScript ?

Four Contenders

- Lua
    - Was the first choice
    - Was 9 years old in 2004
- JavaScript
    - SpiderMonkey (The Engine) was already 8 years old in 2004
- Ferite
    - Was discontinued in 2004
- Python
    - Didn't fit as a core engine extension.
    - Works better when standalone

Lua vs JavaScript

LUA

Pros:

- Industry standard
- Fast

Cons:

- Few developers knew it when the decision was made
- Forgiving Syntax

JavaScript

Pros:

- More commonly used language
- Supports OOP

Cons:

- Used to be slower than LUA

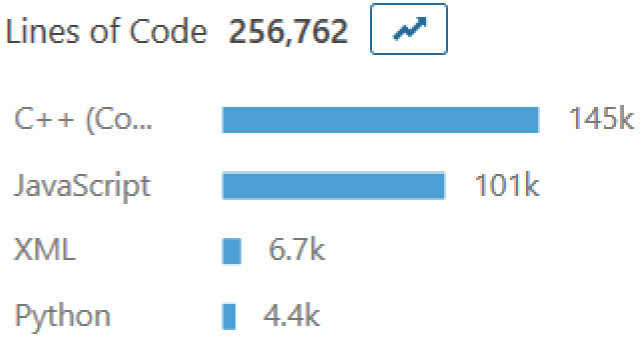
Performance

- LUA used to perform faster than JavaScript
- LUA could execute about 550 calls per frame and JavaScript about 230.
- VC++ could manage over 8000 in the same amount of time.

Language	Ackermann's Function	Nested Loop (16M)	Hash Tables (80k)	Method Calls (2M)
LUA	110ms	1,462ms	1,061ms	5,397ms
JavaScript	310ms	10,124ms	1,922ms	8,5552

Conclusion

- While not as performant, JavaScript still performs alright
- It lowers the bar for external contributors as JS is a more common skill than LUA
- Might allow us to switch to TypeScript in the future if that's what we want
- Allow us to quickly test things outside and generate graphs (node vuejs) without having to write extra code



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Versioning

Main Repository

Why not git ? Why not GitHub or GitLab?

Main repository

- Apache Subversion known as SVN
    - Historical reasons (Git wasn’t out yet in 2005)
    - Binary file management
    - Git clones everything while SVN only the current tree
    - 8GB of files
        - Around 5GB of binary files.

Why not git ? Why not GitHub or GitLab?

- We want to self host our source to avoid hosting fees.
- Git LFS is not worth the trouble switching to:
  - you need to setup mirrors for the files
  - the administration required means less time working on the game itself

- SVN is easier to explain for nontechnical people, no need of merging
- We provide a GitHub mirror
- The workflow for submitting changes is agnostic of the versioning system

Contribution Management

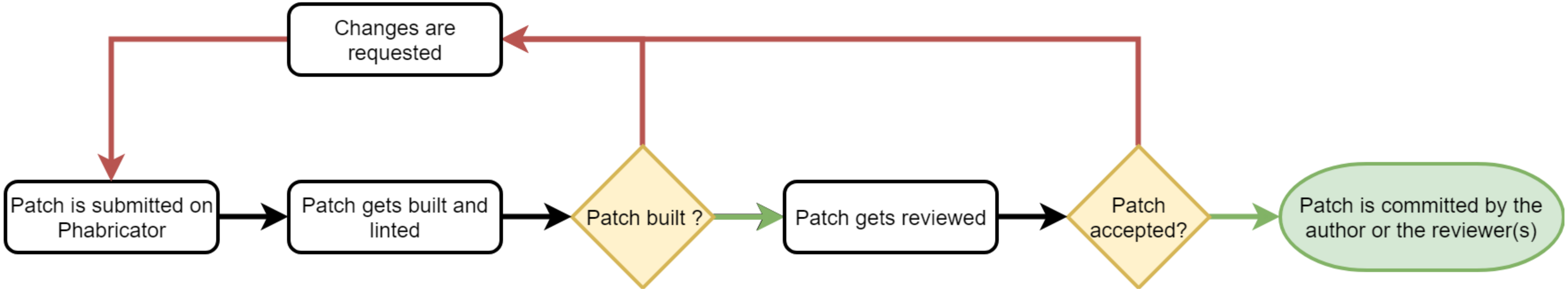
Recruitment

Contribution submission process

Phabricator

Arcanist

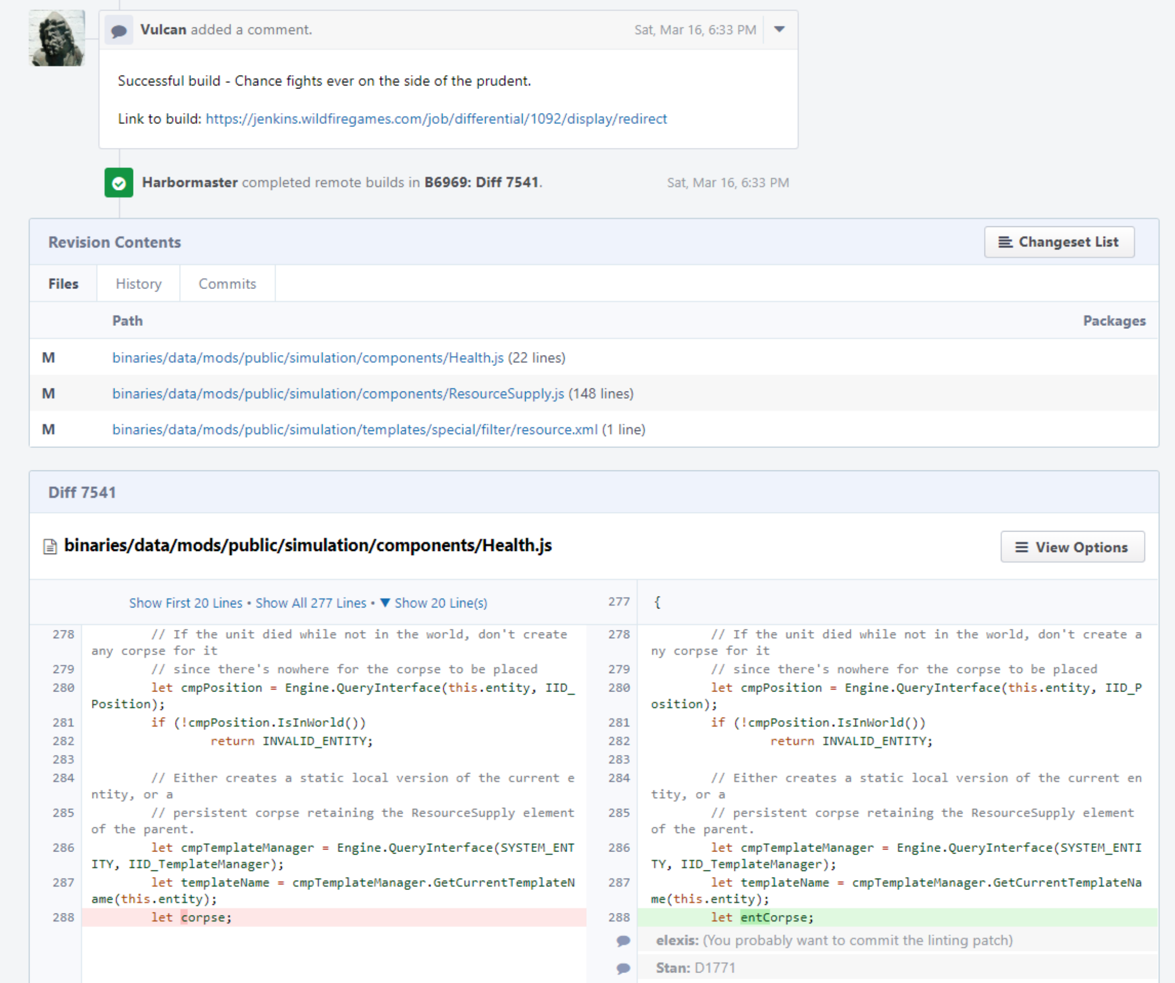
Contribution submission process



Changes are requested
Patch is submitted on Phabricator
Patch gets built and linted
Patch built ?
Patch gets reviewed
Patch accepted?
Patch is committed by the author or the reviewer(s)

Phabricator

- Phabricator (https://code.wildfiregames.com)
  - suite of web-based software development collaboration tools,
    - Differential code review tool,
    - Diffusion repository browser,
    - Herald change monitoring tool
    - Maniphest bug tracker
    - Phriction wiki
    - Arcanist command line tools
  - integrates with Git, Mercurial, and Subversion.



Vulcan added a comment. Sat, Mar 16, 6:33 PM

Successful build - Chance fights ever on the side of the prudent.

Link to build: https://jenkins.wildfiregames.com/job/differential/1092/display/redirect

Harbormaster completed remote builds in **B6969: Diff 7541**. Sat, Mar 16, 6:33 PM

Revision Contents

	Path	Packages
M	binaries/data/mods/public/simulation/components/Health.js (22 lines)	
M	binaries/data/mods/public/simulation/components/ResourceSupply.js (148 lines)	
M	binaries/data/mods/public/simulation/templates/special/filter/resource.xml (1 line)	

Diff 7541

binaries/data/mods/public/simulation/components/Health.js

View Options
Show First 20 Lines • Show All 277 Lines • ▼ Show 20 Line(s)

```
		// If the unit died while not in the world, don't create any corpse for it
		// since there's nowhere for the corpse to be placed
		let cmpPosition = Engine.QueryInterface(this.entity, IID_Position);
		if (!cmpPosition.IsInWorld())
			return INVALID_ENTITY;

		// Either creates a static local version of the current entity, or a
		// persistent corpse retaining the ResourceSupply element of the parent.
		let cmpTemplateManager = Engine.QueryInterface(SYSTEM_ENTITY, IID_TemplateManager);
		let templateName = cmpTemplateManager.GetCurrentTemplateName(this.entity);
		let corpse;
```

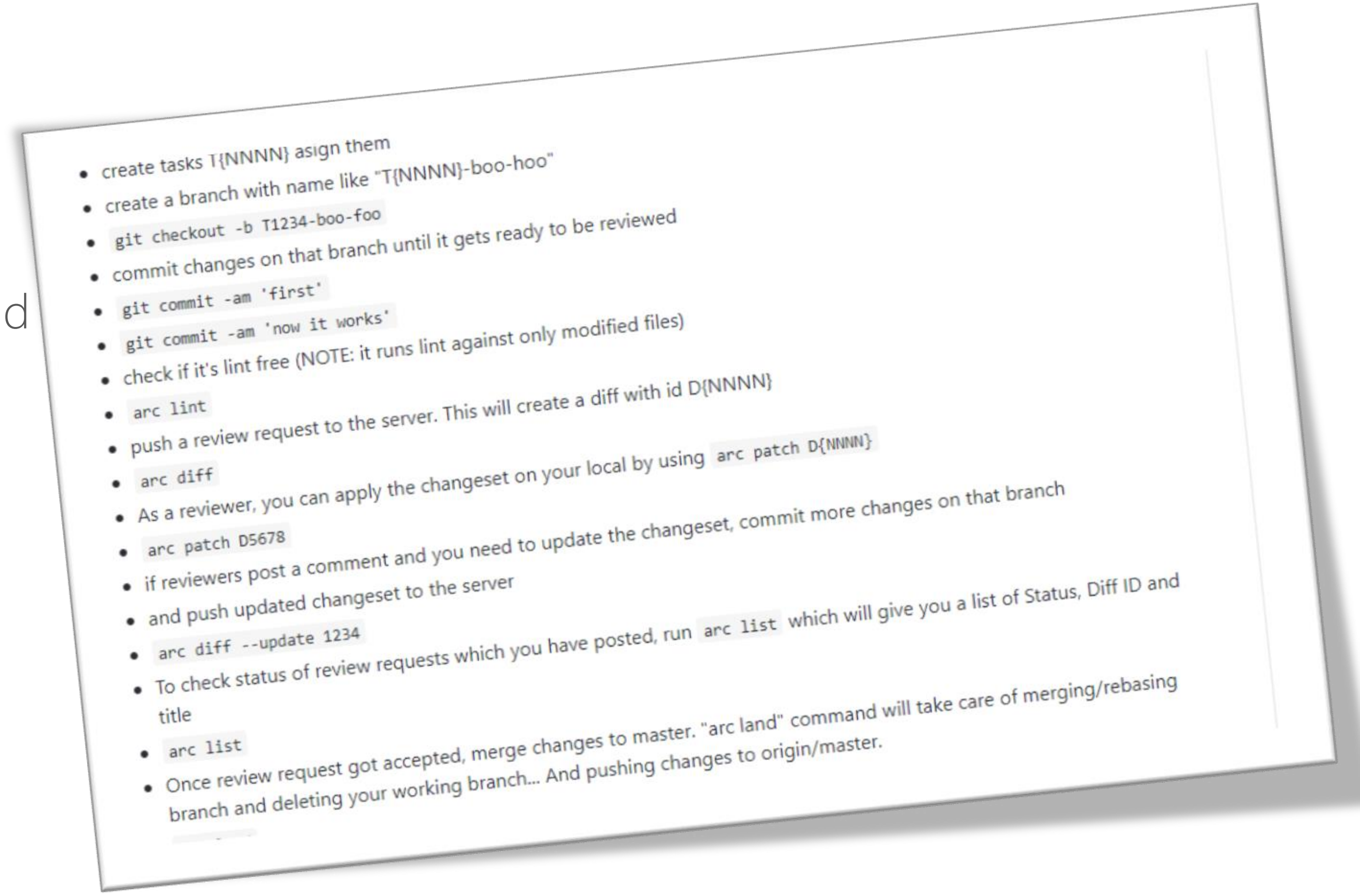
```
{
		// If the unit died while not in the world, don't create any corpse for it
		// since there's nowhere for the corpse to be placed
		let cmpPosition = Engine.QueryInterface(this.entity, IID_Position);
		if (!cmpPosition.IsInWorld())
			return INVALID_ENTITY;

		// Either creates a static local version of the current entity, or a
		// persistent corpse retaining the ResourceSupply element of the parent.
		let cmpTemplateManager = Engine.QueryInterface(SYSTEM_ENTITY, IID_TemplateManager);
		let templateName = cmpTemplateManager.GetCurrentTemplateName(this.entity);
		let entCorpse;
```

elexis: (You probably want to commit the linting patch)

Stan: D1771

Arcanist

- Arcanist
  - Command line tool
  - Can be used to submit, review and land (commit) patches to code repositories
  - Directly integrated in Phabricator



- create tasks T{NNNN} asign them
- create a branch with name like "T{NNNN}-boo-hoo"
- `git checkout -b T1234-boo-foo`
- commit changes on that branch until it gets ready to be reviewed
- `git commit -am 'first'`
- `git commit -am 'now it works'`
- check if it's lint free (NOTE: it runs lint against only modified files)
- `arc lint`
- push a review request to the server. This will create a diff with id D{NNNN}
- `arc diff`
- As a reviewer, you can apply the changeset on your local by using `arc patch D{NNNN}`
- `arc patch D5678`
- if reviewers post a comment and you need to update the changeset, commit more changes on that branch
- and push updated changeset to the server
- `arc diff --update 1234`
- To check status of review requests which you have posted, run `arc list` which will give you a list of Status, Diff ID and title
- `arc list`
- Once review request got accepted, merge changes to master. "arc land" command will take care of merging/rebasing branch and deleting your working branch... And pushing changes to origin/master.

Bug Tracking

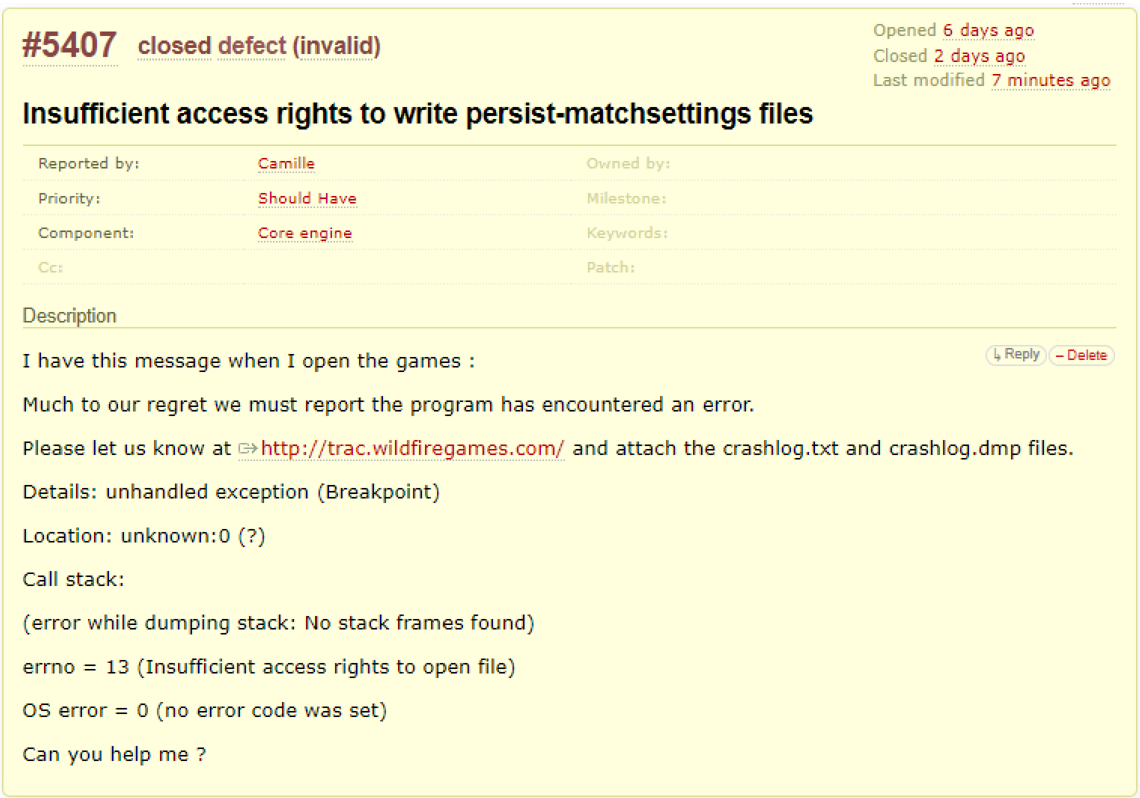
Bug Tracking

Wiki

Bug Tracking

trac
Integrated SCM & Project Management

- https://trac.wildfiregames.com
- 1200+ Open Tickets
- People post their crash logs on new tickets
- 3 Pet Peeves types of tickets
  - Graphics card specific bugs
  - Random freezes on some platforms
  - Permission bugs



#5407 closed defect (invalid)

Opened 6 days ago
Closed 2 days ago
Last modified 7 minutes ago

Insufficient access rights to write persist-matchsettings files

Reported by:	Camille	Owned by:	
Priority:	Should Have	Milestone:	
Component:	Core engine	Keywords:	
Cc:		Patch:	

Description

I have this message when I open the games :

Much to our regret we must report the program has encountered an error.

Please let us know at http://trac.wildfiregames.com/ and attach the crashlog.txt and crashlog.dmp files.

Details: unhandled exception (Breakpoint)

Location: unknown:0 (?)

Call stack:

(error while dumping stack: No stack frames found)

errno = 13 (Insufficient access rights to open file)

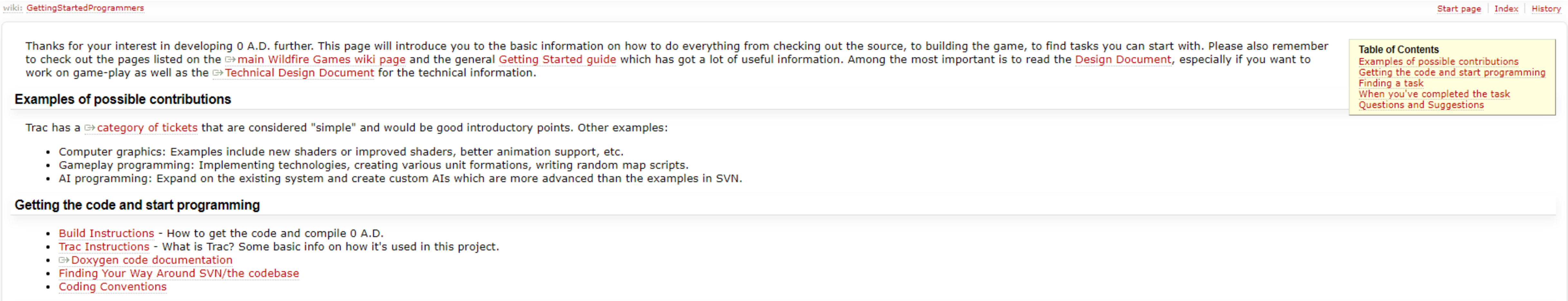
OS error = 0 (no error code was set)

Can you help me ?

Wiki

- Provides information about the process to get the code build the libraries etc.
- Initial game design documents
- Might be outdated
- Does not replace the forums

- Everyone can edit it
- Changes are versioned
- Provides a browser for the SVN repository
- many guides on the different topics (modding, map making, …)



wiki: GettingStartedProgrammers

Start page | Index | History

Thanks for your interest in developing 0 A.D. further. This page will introduce you to the basic information on how to do everything from checking out the source, to building the game, to find tasks you can start with. Please also remember to check out the pages listed on the main Wildfire Games wiki page and the general Getting Started guide which has got a lot of useful information. Among the most important is to read the Design Document, especially if you want to work on game-play as well as the Technical Design Document for the technical information.

Table of Contents

Examples of possible contributions

Trac has a category of tickets that are considered "simple" and would be good introductory points. Other examples:

- Computer graphics: Examples include new shaders or improved shaders, better animation support, etc.
- Gameplay programming: Implementing technologies, creating various unit formations, writing random map scripts.
- AI programming: Expand on the existing system and create custom AIs which are more advanced than the examples in SVN.

Getting the code and start programming

- Build Instructions - How to get the code and compile 0 A.D.
- Trac Instructions - What is Trac? Some basic info on how it's used in this project.
- Doxygen code documentation
- Finding Your Way Around SVN/the codebase
- Coding Conventions

Continuous Integration

Linting

Jenkins

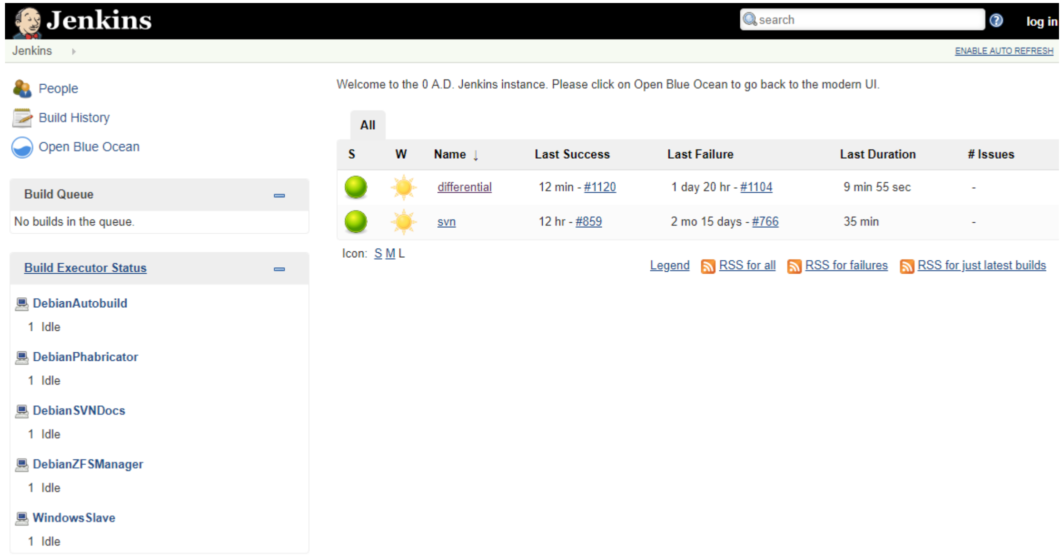
Linting

- Coala
  - provides a unified command-line interface for linting and fixing all your code, regardless of the programming languages
  - CPP-Check
  - Custom Python scripts
  - Eslint (eslintrc.json)
  - JsHint (jshintrc.json)

Jenkins

- Jenkins is an open source automation server written in Java.
- Used to manage our build system and our auto builds

- Each time a patch is submitted to Phabricator it is built and tests are run, and the linter analyzes the file for syntax errors and tests the file against coding conventions.



Welcome to the 0 A.D. Jenkins instance. Please click on Open Blue Ocean to go back to the modern UI.

S	W	Name ↓	Last Success	Last Failure	Last Duration	# Issues
●	☀	differential	12 min - #1120	1 day 20 hr - #1104	9 min 55 sec	-
●	☀	svn	12 hr - #859	2 mo 15 days - #766	35 min	-

Icon: S M L

Build Queue

No builds in the queue.

Build Executor Status

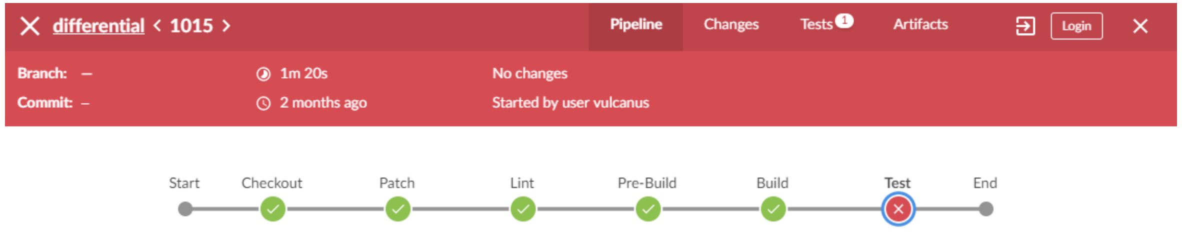
DebianAutobuild
1 Idle

DebianPhabricator
1 Idle

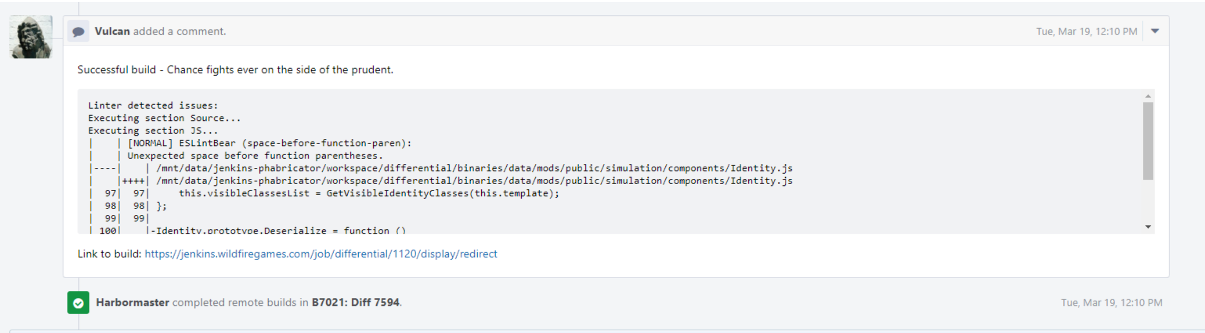
DebianSVNDocs
1 Idle

DebianZFSManager
1 Idle

WindowsSlave
1 Idle



Branch: –
Commit: –
1m 20s
2 months ago
No changes
Started by user vulcanus



Vulcan added a comment. Tue, Mar 19, 12:10 PM

Successful build - Chance fights ever on the side of the prudent.

```
Linter detected issues:
Executing section Source...
Executing section JS...
|    | [NORMAL] ESLintBear (space-before-function-paren):
|    | Unexpected space before function parentheses.
|----|    | /mnt/data/jenkins-phabricator/workspace/differential/binaries/data/mods/public/simulation/components/Identity.js
|    |++++| /mnt/data/jenkins-phabricator/workspace/differential/binaries/data/mods/public/simulation/components/Identity.js
|  97|  97|     this.visibleClassesList = GetVisibleIdentityClasses(this.template);
|  98|  98| };
|  99|  99|
| 100|    |-Identity.prototype.Deserialize = function ()
```

Link to build: https://jenkins.wildfiregames.com/job/differential/1120/display/redirect

Harbormaster completed remote builds in **B7021: Diff 7594**. Tue, Mar 19, 12:10 PM

Hosting

Hosting solutions

Why not Steam / Microsoft Store / Apple Store

Hosting solutions

- 1 Server
- 11 Virtual Machines
- Specs:
  - Intel Xeon E5-1650V2
  - 64 GB RAM ECC
  - 2 x 2000 GB Enterprise HDD
  - € 50,42 monthly (600€ per year)

HETZNER
ONLINE

Why not Steam / Microsoft Store / Apple Store

- Cons:
  - Entry price
  - License Issues
    - GPLV2 not compatible with apple store
  - We are in alpha and this might ruin our reputation if the players review bomb the game
  - Lack of control if we use their tools
- Pros:
  - Visibility

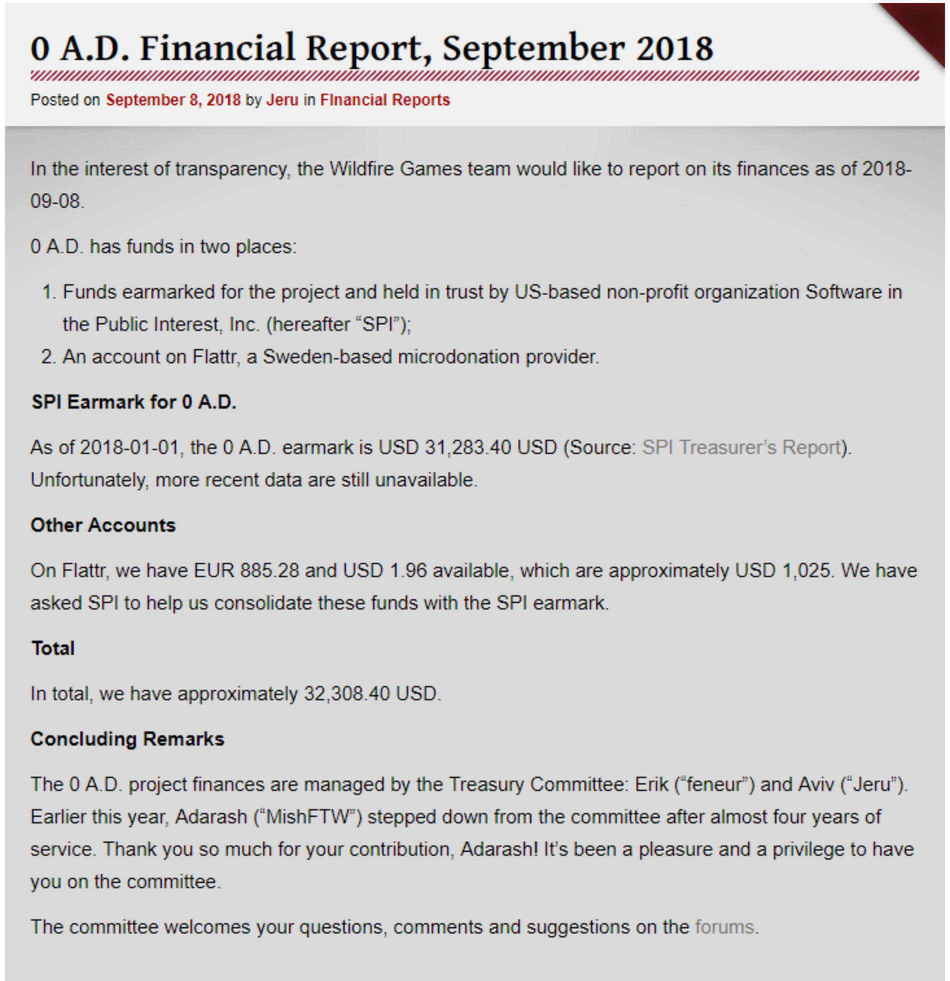
Funding

Money Matters

Crowd Funding

Money Matters

- Our funds are managed by SPI (Software in the Public Interest https://www.spi-inc.org/ a non-profit organization formed to help other organizations create and distribute free/open-source software and open-source hardware.
- Money donated is used for:
  - Running costs such as hosting our website and licensing our forum software
  - Paying contractors for developing 0 A.D., and
  - Reimbursing contributors for expenses related to the project.
  - Goodies and events
    - Capitole du libre (Toulouse) (Next 16th 17th November 2019)
    - FOSDEM (Brussels) (Next : 1st 2nd February 2020)
    - JDLL (Lyon) (Next 4th 5th April 2020)
    - RMLL (Changing locations)
    - AFGRAL (Rennes)



0 A.D. Financial Report, September 2018

Posted on September 8, 2018 by Jeru in Financial Reports

In the interest of transparency, the Wildfire Games team would like to report on its finances as of 2018-09-08.

0 A.D. has funds in two places:

1. Funds earmarked for the project and held in trust by US-based non-profit organization Software in the Public Interest, Inc. (hereafter “SPI”);
2. An account on Flattr, a Sweden-based microdonation provider.

SPI Earmark for 0 A.D.

As of 2018-01-01, the 0 A.D. earmark is USD 31,283.40 USD (Source: SPI Treasurer’s Report). Unfortunately, more recent data are still unavailable.

Other Accounts

On Flattr, we have EUR 885.28 and USD 1.96 available, which are approximately USD 1,025. We have asked SPI to help us consolidate these funds with the SPI earmark.

Total

In total, we have approximately 32,308.40 USD.

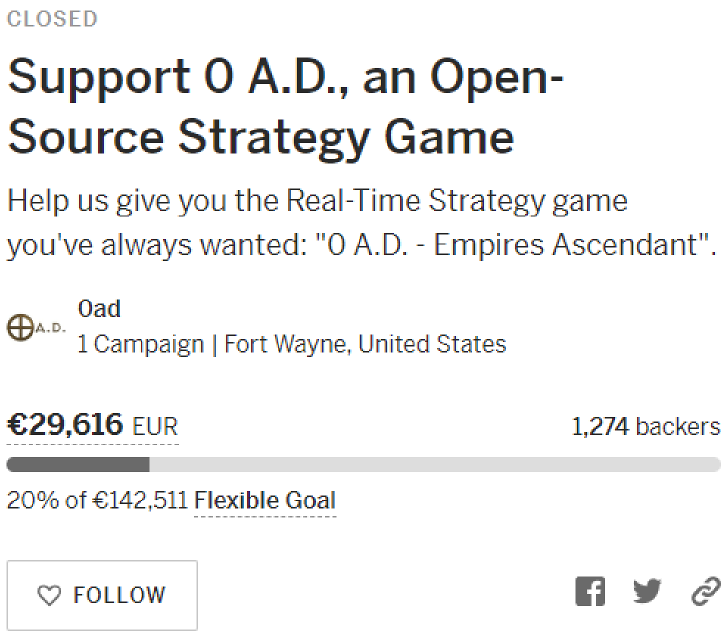
Concluding Remarks

The 0 A.D. project finances are managed by the Treasury Committee: Erik (“feneur”) and Aviv (“Jeru”). Earlier this year, Adarash (“MishFTW”) stepped down from the committee after almost four years of service. Thank you so much for your contribution, Adarash! It’s been a pleasure and a privilege to have you on the committee.

The committee welcomes your questions, comments and suggestions on the forums.

Crowd Funding

- Started September the 5th 2013
- Not enough to hire a team member as a full-time developer.
- 2 years necessary to send the perks to the donators
- Recently, we started considering the possible purposes of that money



CLOSED

Support 0 A.D., an Open-Source Strategy Game

Help us give you the Real-Time Strategy game you've always wanted: "0 A.D. - Empires Ascendant".

Oad
1 Campaign | Fort Wayne, United States

€29,616 EUR 1,274 backers

20% of €142,511 **Flexible Goal**

0 A.D. Official Fundraiser
Powered by
indiegogo
SPI Software in the Public Interest, Inc.

Legal

GDPR

COPPA

Terms

GDPR

Personal data is everything that "relates" to a user (GDPR 4)

Purpose restriction - no data processing without purpose (GDPR 5)

Data minimization - only process as much data as necessary to achieve the purposes (GDPR 5)

Legal base for processing - consent, legitimate interest or performance of a contract (GDPR 6)

User rights – Allow users to :

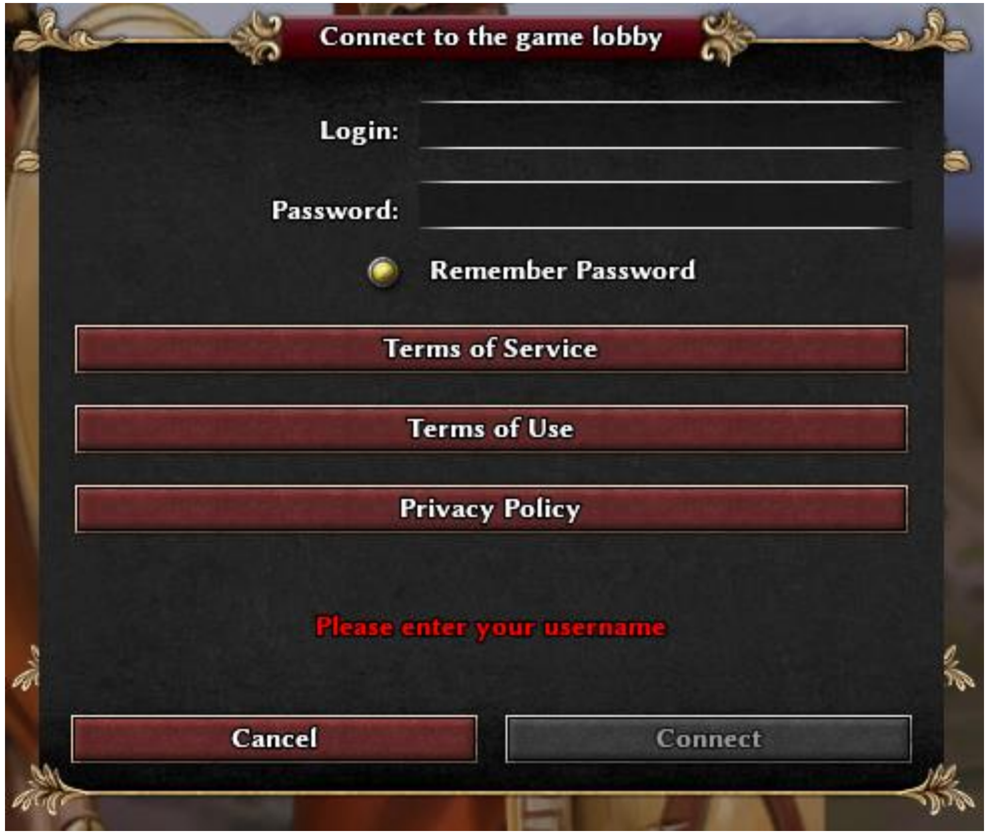
- Update/delete their data
- Request their data in an understandable format as long as the request is legitimate.
- Lodge a complaint

COPPA

- COPPA protects children below the age of 13 from commercial exploitation without parental consent
- 0 A.D. has a general audience and due to the depictions of violence and the language used not suited for children below 13 without parental consent

Terms

- Terms of Service
  - Contract of adhesion
  - Must be read and accepted to use the service
- Terms of Use
  - Behave like this or the server is denied to you



Connect to the game lobby

Login:

Password:

○ Remember Password

Please enter your username

Recruitment and communication

Internal and external communication medias

Recruitment process

Open positions

Internal and external communication medias

- Staff forums
- Public forums
- IRC
    - Recently bridged with Matrix and Discord) Discontinued
- Staff meetings
    - #info and #actions
    - Full logs and summaries are publicly available
    - https://wiki.debian.org/MeetBot
- https://www.facebook.com/play0ad/
- https://twitter.com/play0ad
- https://www.reddit.com/r/0ad/
- https://play0ad.bandcamp.com

Recruitment process

- Selection by the number of contributions and/or the value of the contributions
- Recruitment forms on the forums (Artists)
- Legal waivers
- Used to be a simple interview to become a member, now a person must make contributions before being approved

Open positions

- We're looking for Programmers:
- DevOps
    - Updating scripts
- Maintainers
    - Removing deprecated code
    - Updating documentation
- Engine
    - Pathfinding
    - GFX (Vulkan, Instancing)
    - SFX (Ambient Sounds, Sound Mixing)
    - Networking (Hotseat)
    - Threading (Network, Pathfinder)
    - Unit Testing
    - Finding potential memory leaks

- AI
    - Making the bot smarter
    - Implementing real Machine Learning/Clustering
- Reviewers
    - Looking for design flaws

Thank you for listening !
Any questions ?

avanade