



0 A.D: Empires Ascendant, a FOSS Game

Mini Deb Conf – November 2020

by Stanislas Dolcini

Index

1. Project Presentation
2. The Engine
3. Tools
4. Hosting
5. Legal
6. Recruitment and Communication
7. Funding





Project Presentation

What is 0 A.D.

Users

History

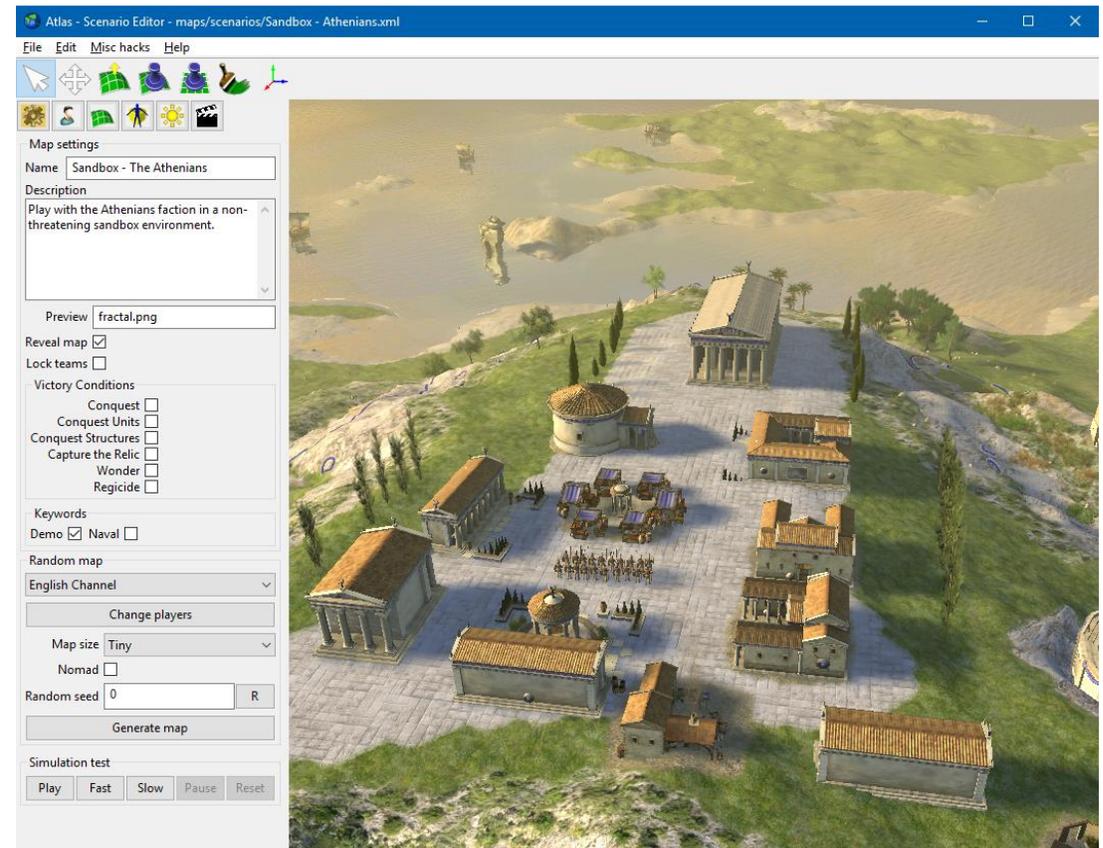
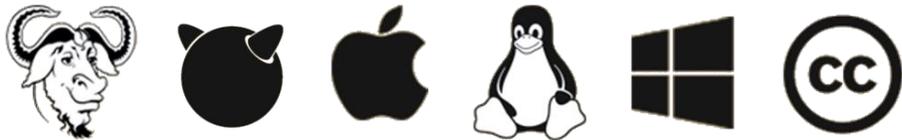
Team

Features

Progress Report

What is 0 A.D: Empires Ascendant

- A historical, antiquity based, real time strategy game.
 - From a simple military base, grow, evolve, and beat your enemies.
- A Free Libre Open-Source Software, multi-platform game.
- The game is already playable.
- Available on Mac OS, GNU/Linux, BSD and Windows on <https://play0ad.com>



"Atlas", the map editor

History

- Started in 2001 by Microsoft's Age of Empires: Age of Kings players (Tonto Clan) and modders.
- Originally, they created the « Rome at War » mod
- Project was made Open Source in 2009
- Latest version is Alpha 23b : Ken Wood (24th release) December 2018



<https://www.moddb.com/mods/rome-at-war>

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 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



The single player game setup options

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/>

Users

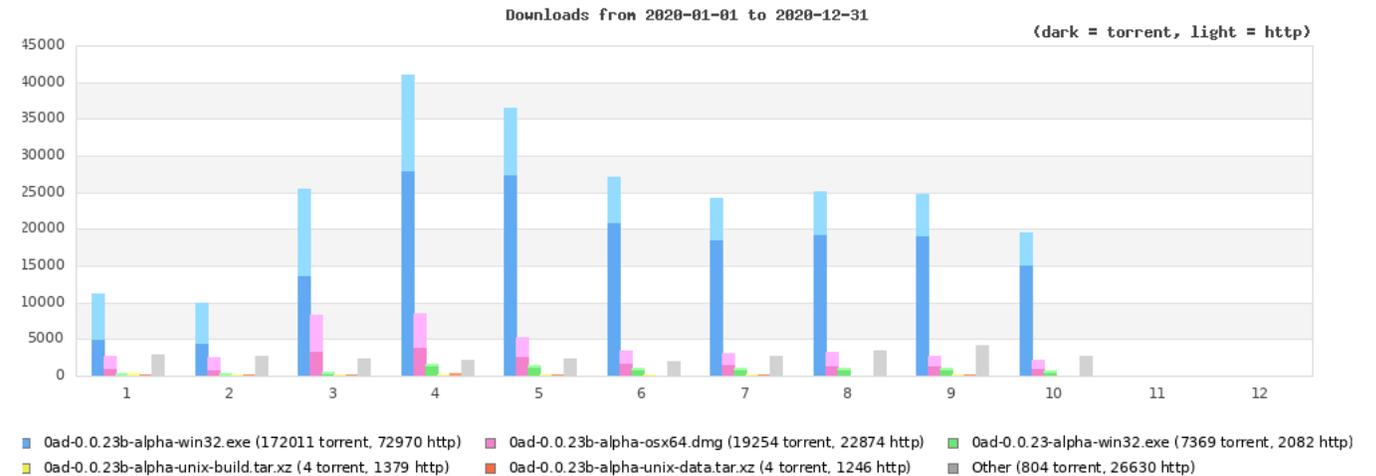
- 100k multiplayer accounts 5k used every month
- Between 60 and 120 lobby players online simultaneously at the evening
- 342k total downloads in 2020 + Downloads from Linux Package Manager

Based on data voluntarily submitted by players of [0 A.D.](#) from 2019-12-01 to 2020-01-12.

OSes

OS	Ratio	
Linux	40.33%	(3980)
macOS	12.75%	(1258)
Windows	46.84%	(4623)

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



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

What is new in A23

- New 3D Models
- New maps and game modes
- Mod.io an open-source steam workshop
- Building range is now visible
- Diplomacy colors
- GDPR Compliance
- A new faction: the Kushites



What is new since A23

- Programming
 - Improved pathfinding code and performance
 - Improved water reflection
 - MSAA / FXAA
 - Wayland support
 - Better CI scripts
 - Better UTF-8 Support
 - No more fixed function pipeline
 - Spider Monkey 45 & 52 upgrades
 - Improved GUI code and performance
 - Code fixes and memory leak fixes



<https://play0ad.com/0-a-d-development-report-may-august-2019/>

What is new since A23

- Art

- New Flora, new fauna
- Some new buildings
- New maps
- New unit textures
- Kushite and Farsi voices
- Arsenals, Ranges, Stables
- Improved icons
- Unit equipment overhaul



<https://play0ad.com/0-a-d-development-report-may-august-2019/>



The Engine

Pyrogenesis: an open source RTS engine

Pyrogenesis: an open source RTS engine

- Homegrown game engine
- Game Languages:
 - C++
 - JavaScript (Mozilla Engine)
- Assets: XML/JSON/
- Tools Perl/Python
- Build LUA (Premake)
- Multiplayer chat XMPP
- (Translation) PO files (transifex.com)
- OpenGL 2.0+, ARB Shaders
- Third party libraries: Boost, Enet, Gloom, Iconv, ICU, libcurl, libpng, libsodium, libxml2, miniupnpc, OpenAL, Vorbis, Wxwidgets, nvtt, zlib, Fcollada, Spider Monkey SDL 2 cxxtests.





Contribution Management

Recruitment

Phabricator

Contribution submission process

Arcanist

Phabricator

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

The screenshot displays a Phabricator interface for a code review. At the top, a comment from 'Vulcan' is shown, followed by a build status notification from 'Harbormaster'. Below this is a 'Revision Contents' table listing files in a directory structure. The main section shows a diff for 'binaries/data/mods/public/simulation/components/Health.js'. The diff is split into two columns, showing the original code on the left and the proposed changes on the right. Line 288 shows a change from 'let corpse;' to 'let entCorpse;'. Comments at the bottom of the diff mention 'elaxis' and 'Stan: D1771'.

Files	History	Commits
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

```
278 // If the unit died while not in the world, don't create
278 // If the unit died while not in the world, don't create
279 any corpse for it
279 any corpse for it
280 // since there's nowhere for the corpse to be placed
280 // since there's nowhere for the corpse to be placed
281 let cmpPosition = Engine.QueryInterface(this.entity, IID_P
281 let cmpPosition = Engine.QueryInterface(this.entity, IID_P
282 Position);
282 Position);
283 if (!cmpPosition.IsInWorld())
283 if (!cmpPosition.IsInWorld())
284     return INVALID_ENTITY;
284     return INVALID_ENTITY;
285
285 // Either creates a static local version of the current e
285 // Either creates a static local version of the current e
286 nity, or a
286 nity, or a
287 // persistent corpse retaining the ResourceSupply element
287 // persistent corpse retaining the ResourceSupply element
288 of the parent.
288 of the parent.
289 let cmpTemplateManager = Engine.QueryInterface(SYSTEM_ENT
289 let cmpTemplateManager = Engine.QueryInterface(SYSTEM_ENTI
290 ITY, IID_TemplateManager);
290 TY, IID_TemplateManager);
291 let templateName = cmpTemplateManager.GetCurrentTemplateN
291 let templateName = cmpTemplateManager.GetCurrentTemplateNa
292 ame(this.entity);
292 ame(this.entity);
293 let corpse;
293 let entCorpse;
```

elaxis: (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 I{NNNN} assign 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.



Tools

Repositories

Bug Tracking

Wiki

Linting

Continuous Integration

Repositories

- Apache Subversion known as SVN
 - 8GB of files
 - Around 5GB of binary files.
 - Historical reasons (Git wasn't out yet in 2005)
 - Git clones everything while SVN only the current tree
 - Binary file management
 - Two git mirrors, Gitlab and GitHub



Bug Tracking

- <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 : ↳ Reply - Delete

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, ...)

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](#))**



Continuous Integration



- 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.

The screenshot shows the Jenkins dashboard with a table of recent builds:

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	-

Below the table, the 'differential' build is selected, showing a red status bar with the following information:

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

The screenshot shows a build log with the following content:

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

Linter detected issues:
Executing section JS...
Executing section JS...
| [WARNING] 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.vrototvqe.Deserialize = function ()
```





Hosting

Hosting solutions

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



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 if 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





Recruitment and communication

Internal and external communication medias

Recruitment process

Open positions

Internal and external communication medias

- Staff forums
- Public forums
- IRC
- 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>
- <https://www.linkedin.com/company/345131/admin/>
- <https://mastodon.social/web/accounts/1074531>
- <https://www.instagram.com/play0ad.official/>
- <https://fr.linkedin.com/company/wildfire-games>



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 has to make contributions before being approved



Open positions

- Looking for Programmers:
 - AI
 - Making the bot smarter
 - Implementing real Machine Learning/Clustering
 - Engine
 - Pathfinding
 - Graphics (Vulkan, Instancing)
 - Networking (Hotseat, Headless Server)
 - Threading (Network, Pathfinder)
 - Unit Testing
- Maintainers
 - Removing deprecated code
 - Updating documentation
- DevOps
 - Updating scripts
- Reviewers
 - Looking for design flaws
 - Finding potential memory leaks



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
 - FOSDEM (Brussels)
 - JDLL (Lyon)
 - RMLL (Changing locations)
 - AFGRAL (Rennes)
 - Capitole du libre (Toulouse)



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

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".

⊕^{A.D.} Oad
1 Campaign | Fort Wayne, United States

€29,616 EUR

1,274 backers

20% of €142,511 Flexible Goal

♡ FOLLOW



Thank you for your time





So... What now?

General Challenges

Mac OS Future Challenges

Why not Steam / Microsoft Store / Apple Store

- Cons:
 - Entry price
 - License Issues GPLv2 No CLA
 - 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



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 as you need to setup mirrors for the files and the administration required means less time for fun stuff for players
- 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



Python Migration : Spider Monkey

- Currently used version: SM 45
 - SM 45
 - GCC 4.8.1
 - C++11
 - Python2
 - MSVC 2015
 - SM 52
 - GCC 6.1
 - C++14
 - Python 2
 - MSVC 2015
 - SM 60
 - GCC 6.1
 - C++14
 - Python 2
 - MSVC 2015
- Biggest leap
- SM 68
 - GCC 6.1
 - C++14
 - Python 2
 - MSVC 2015
 - SM 78
 - GCC 7+
 - C++17
 - Rust LLVM
 - MSVC 2017



<https://packages.gentoo.org/packages/dev-lang/spidermonkey>

https://en.wikipedia.org/wiki/Microsoft_Visual_C%2B%2B

https://en.cppreference.com/w/cpp/compiler_support

Python Migration : Python Scripts

Script Name	Function	Priority	Required	Status
Translation Checker	Uploads the translation to Transifex	Medium	Yes	Waiting for review
FontBuilder	Creating Font Texture	Low	No	Waiting for review
SelectionTexGen	Creating selection textures	Deprecated	No	Waiting for review
Templates Analyser	Creates charts for balancing	Low	No	Waiting for review
XML Validator	Validates game files	Low	No	Waiting for review

<https://code.wildfiregames.com/D2757> i18n scripts - switch from pology to Babel for .POT generation and update to python3

<https://code.wildfiregames.com/D2501> Port scripts to python 3 before doomsday

Mac OS Future Challenges

- Open AL, Open CL, and Open GL deprecations
- HiDPI Support (Retina displays)
- Dark mode support (Wx Widgets)
- Zink?



MacOS



Technical details

- 4k texture resolution support
 - PNG and DDS (S3TC compression) support
- Models up to 32 768 vertices per mesh
 - 1 Material, 2 (Diffuse, Prebaked AO) UV supported
 - DAE Format
 - In house PMD and PSA Formats
 - Scaling not supported in those files.



Brittonic struct texture

Contribution submission process

