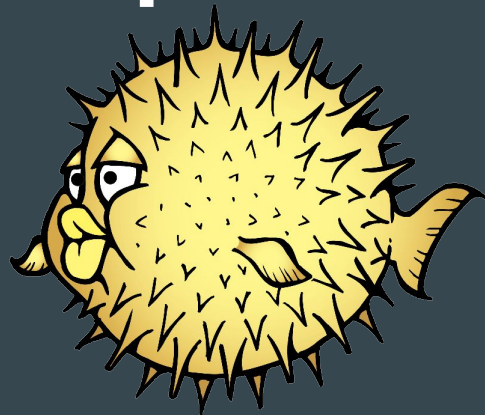


# Life Outside the Big 4: The Adventure of D on OpenBSD



...

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DConf Online 2021



**“OpenBSD is the best  
supported platform in the D  
ecosystem”**

Brian Callahan, DConf 2021



**Why would you say something so controversial yet so brave?**

# Quick about me

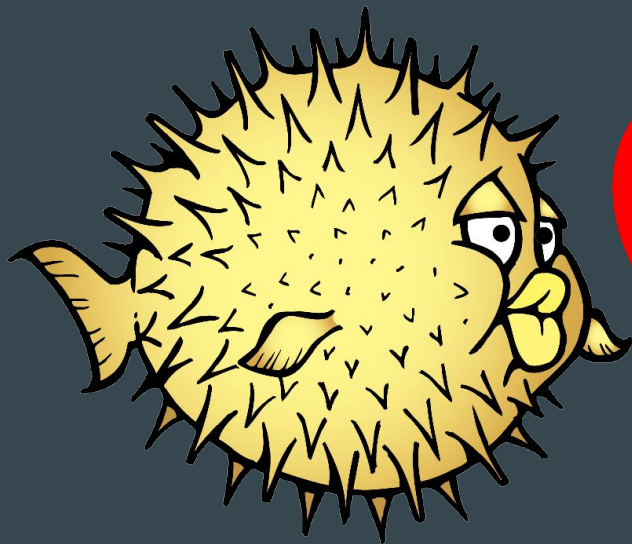
- OpenBSD developer since 2013
- Mostly ports and packages (maintain about 150 of them)
- Helped to port around 50 languages to OpenBSD, including D
- Professor in the ITWS program at Rensselaer Polytechnic Institute in Upstate NY
- Research cybersecurity pedagogy, digital humanities, amateur radio communications protocols
- Teach cybersecurity and web science courses

# What do I mean by the “Big 4”?

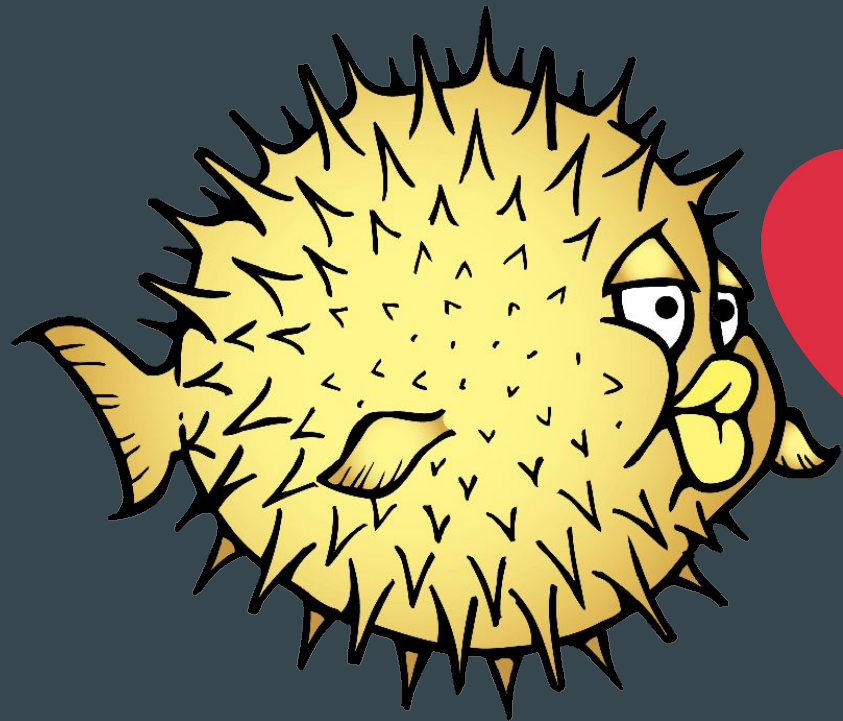
- I learned about the D Foundation and its concept of support from Walter when I had first arrived on the forums.
  - [https://forum.dlang.org/post/s2j7kf\\$1f7u\\$1@digitalmars.com](https://forum.dlang.org/post/s2j7kf$1f7u$1@digitalmars.com)
- FreeBSD, Linux, macOS, and Windows are the Big 4.
  - You can download binaries for these platforms directly from <https://dlang.org/download.html>
- What’s the status of D compiler availability outside the Big 4? According to Repology.org:
  - LDC: **One** package outside the Big 4
    - OpenBSD: version 1.28.0
    - NetBSD pkgsrc: WIP port, version 1.21.0, unknown if working
  - DMD: **One** complete package outside the Big 4
    - OpenBSD: version 2.098.0 + OpenBSD-specific patches from 2.099.0 + additional patches
    - NetBSD pkgsrc has a package for dmd-2.093.1, macOS only: <https://pkgsrc.se/wip/dmd>
      - No DRuntime of Phobos
    - Haiku (claims to be Linux), version 2.067.1, unknown if working but almost certainly not
  - GDC: **One** package outside the big 4
    - OpenBSD: version 11.2.0
    - But... difficult to truly quantify via Repology.org, perhaps more
- What does it mean to have the “Big 4” + OpenBSD (that has all the same support)?

# In the beginning... I had a very important problem I wanted to solve

- I first learned about D back in 2017.
- But it didn't work out... 😞



March 2021: Enter GDC



# But it wasn't all love at first sight!

## OpenBSD challenges

- We were stuck on an older package of GCC 8
- Confusing state of TLS (more on this in a bit...)
- Fibers were totally broken
  - Now 100% fixed thanks to gkoehler@

## GDC challenges

- Errors in OpenBSD support
- Omissions for important facilities
- Little to no testing (though Iain was on it! I just didn't know...)



# How OpenBSD support happened

- First, it happened because there were interested people on the D team who wanted to support a new platform. Thanks go to (but not limited to) Kai, Iain, Walter, and everyone else who worked on POSIX support for D and specifically \*BSD support.
- Second, it happened because D is happy to carry code for platforms outside the Big 4.
- Third, it happened because I came along and put together all these pieces I found (in the case of DMD). In the case of GDC, Iain and I both put the last pieces together independently around the same time, so thank him for GDC.

# But OpenBSD users expect more!

- OpenBSD has some important facilities that are used in our coding paradigms.
- Perhaps most famously is the `pledge(2)` function and its younger sibling, `unveil(2)`
  - `pledge()` restricts the ability for programs to use syscalls
  - `unveil()` reduces file system visibility
- There are other facilities as well. And once you start, well...
  - <https://github.com/dlang/druntime/commit/43a5f5bcebedcd4584c5a0afaba7bda332f2f685>
  - <https://github.com/dlang/druntime/commit/1cf6be64086c9bec2a4d35223e530e20aa95330d>
  - <https://github.com/dlang/druntime/commit/4fbd50ee1eae9efde94231d874e7bc830d8bf897>
  - <https://github.com/dlang/druntime/commit/f4a2a96355368461e3d1c8d51e00bf759360cc4c>
  - ...and more
- They'd also like packages for this software, too.

# Getting D on OpenBSD, the easy way

If you like DUB:

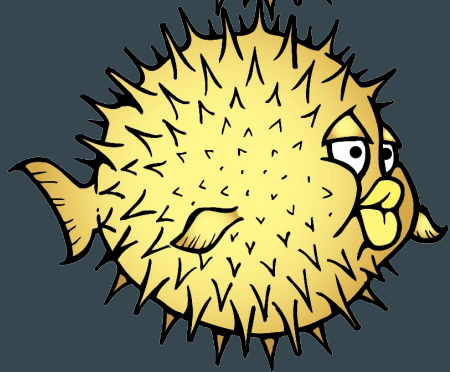
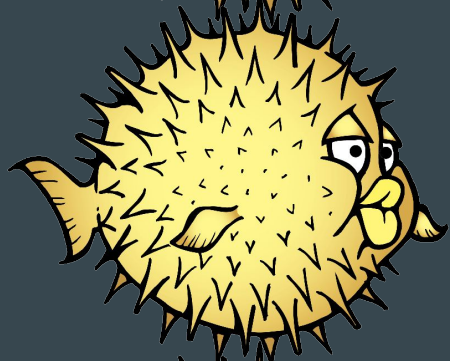
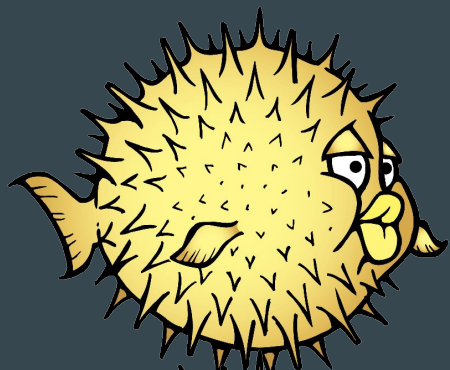
- `$ doas pkg_add dub dtools`

Will ask you which compiler you'd like with dub.

If you don't like DUB:

- `$ doas pkg_add gdc dtools`
- `$ doas pkg_add dmd dtools`
- `$ doas pkg_add ldc dtools`

Note in all cases, the GDC binary is named `egdc` on OpenBSD.



# Difficulties

- The tools repo will not build out of the box when separated from dmd/druntime/phobos, because it assumes you want to download and build a complete dmd toolchain in that case.
  - On OpenBSD, the package rips out that part of the build infrastructure in order to build with gdmd (for multi-platform support).
- Bootstrapping DMD is less than ideal since it assumes a bootstrap will be available on dlang.org servers, will even suggest `AUTO_BOOTSTRAP=1`
  - This one isn't a bad thing, it's just something people working on other platforms should know
- The dub team doesn't run tests with GDC:  
<https://github.com/dlang/dub/issues/2184#issuecomment-944975925>

# What about my operating system?

My general advice:

- If your OS uses ELF binaries and runs on x86\_64, x86, arm, aarch64, powerpc, or powerpc64, you are basically golden. OpenBSD ships GDC 11.2.0 packages for all of those architectures.
  - **GDC 11.2.0 should be considered the starting point for all new operating system support.**
  - *Probably* the easiest one to add DRuntime/Phobos support for additional CPUs
- Focus on one part of the larger ecosystem at a time. Focus on building and supporting all this with GDC.
  - Compiler
  - Runtime
  - Add the gdmnd script at this point, after GDC+Runtime is installed, if you'd like
  - Tools
  - DUB
- Once you've done this, go wild. Port DMD and LDC, and do whatever else you'd like.

# What D taught me/us about OpenBSD

- ELF TLS might actually work fine on OpenBSD
  - Thanks DMD!
- A somewhat challenging porting effort
  - Bootstraps
  - Having different packages for dub based on what compiler you want

# How you can help life for others outside the Big 4

- Err on the side of having a tent-too-big rather than a tent-too-small.
  - Coding on Linux? You're *probably* not targeting Linux, but POSIX. Prefer `version(Posix)` any time you'd want to write `version(linux)`.
    - Good example of exactly this in action: DigitalMars/med:  
<https://github.com/DigitalMars/med/pull/9>
  - Why do this? When you make the barrier to entry as small as possible for those outside the Big 4, you are more likely to gain more users, and more users who (while perhaps not the most populous in number) are likely to be big vocal advocates for D (and good bug reporters).
- Help with porting efforts when they arise
  - This can be done two ways:
    - Getting your hands dirty and trying out new operating systems
    - Answer questions on how to accomplish important bits like DRuntime porting



# What's next?

- The great version(linux) to version(Posix) migration
- Getting more OpenBSD D users
  - And more D devs using OpenBSD!
- Finding and fixing the leftovers



# Thanks!

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