

EMULATION AND THE BLUESCSI

A GUIDE ON HOW TO GET STARTED WITH YOUR VINTAGE MAC

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INTRODUCTION

A recurring problem with vintage computers is how to get stuff from your modern computer to your vintage computer and back. Traditionally you've put your cool stuff on a floppy disk, because every computer had a floppy drive back in the days. If you had some really old computer, you had a chain of computers that got older and older so you could transfer the cool stuff from one machine to another until it reached the computer that you wanted to use.

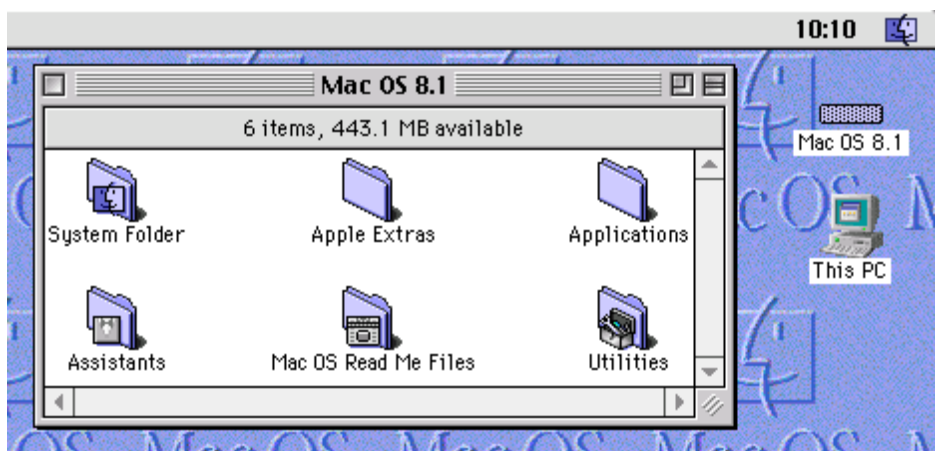


Figure 1. Mac OS 8.1 emulated on a Windows PC with access to the local hard drive on the PC.

Thanks to emulation (fig. 1), you can now put your stuff inside an emulator on your modern computer where you put it on a drive image which you can copy to an SD card that a device like the BlueSCSI (fig. 2) can read on your vintage Macintosh. Maybe not as retro as using floppies, but extremely convenient.

The guide is intended to get you up and started with minimal effort (or at least minimum frustration). So this guide isn't an exhaustive encyclopedia.

I comprised this little guide, in part because I want to organize the knowledge that I've gained researching all this. But also because it took some time to collect all these bits and pieces that I wish that I had known when I started. Quite a bit of the things that I've learned were far from obvious. If this guide can help some of you, that would make me happy.

Throughout this guide I mention several resources. All are listed in the back with links so you can fetch them yourself.

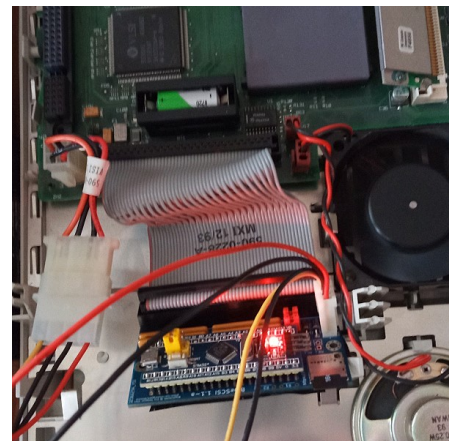


Figure 2. BlueSCSI in a vintage Mac.

SETTING UP BASILISK II v1.1 & SHEEPSHAVER v2.5

For the sake of unstuffing files you've found on the internet and to transfer them to an SD-card for your BlueSCSI, you'll make do with just Basilisk II. It's a 68k emulator and it was mostly the System 6 & 7 era machines that had a SCSI-interface. However, since you're sourcing archived material made of other's goodwill it *can* be useful to be able to run a slightly more modern OS in Sheepshaver (a PPC emulator) to access certain files. But for 98% of all the cases, Basilisk II will be just fine.

TL;DR

For **Basilisk II** you'll need

- 1Mb Mac ROM, clean 32-bit
- Boot image (Sys 7.1 – Mac OS 8.1)

For **Sheepshaver** you'll need

- 4Mb *Old world* Mac ROM
- Boot image (Sys 7.5.1 – Mac OS 9.0.4)

Since both emulators are developed and maintained by the same circle of people, the interface is virtually the same with just minor differences. Hence the instructions for one of them also applies to the other. For setting up for general use, the most relevant tabs will be *Volumes & Memory/Misc*. Once you've gotten the emulator up and running you can adjust other settings.

VOLUMES

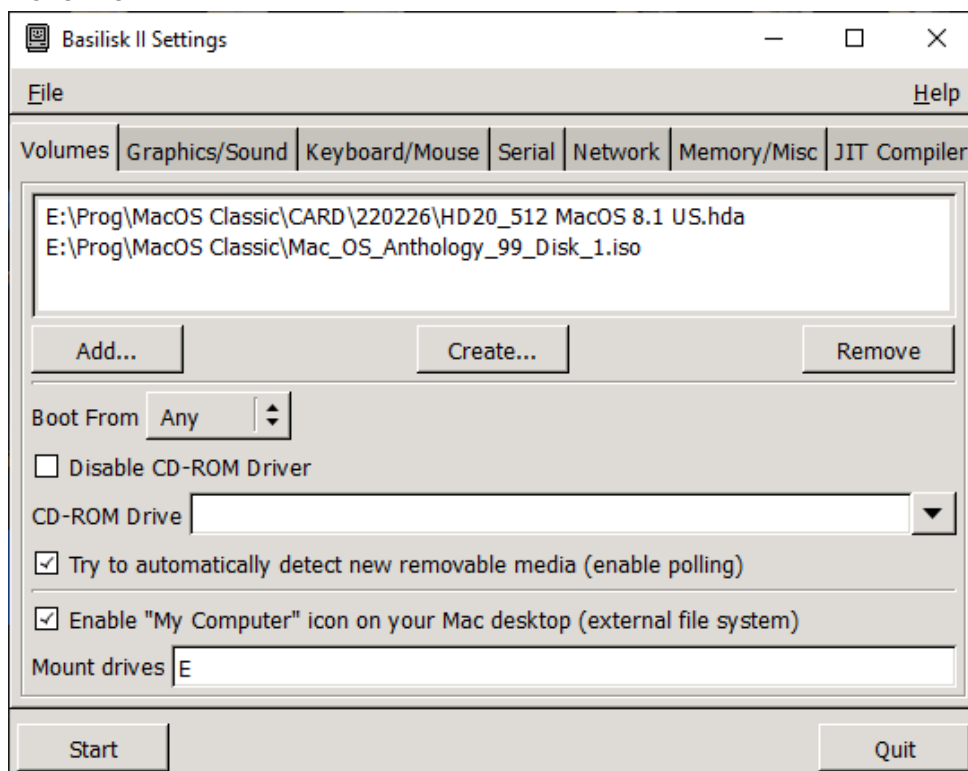


Figure 3. Basilisk II start up screen showing a boot image and an ISO image of a DVD.

Under the tab *Volumes* you add the hard drive, CD and DVD images that you want to use once the emulator is booted up (fig. 3). You need a bootable image with a valid operating system on it. If you're just starting out, try to keep it sane and download an image with System 7.5 or 7.6 for Basilisk II and take it from there. Likewise for Sheepshaver, I recommend any version of OS 8. If

you check the box for *My Computer*, you can access files on your modern computer through the emulator.

MEMORY/MISC

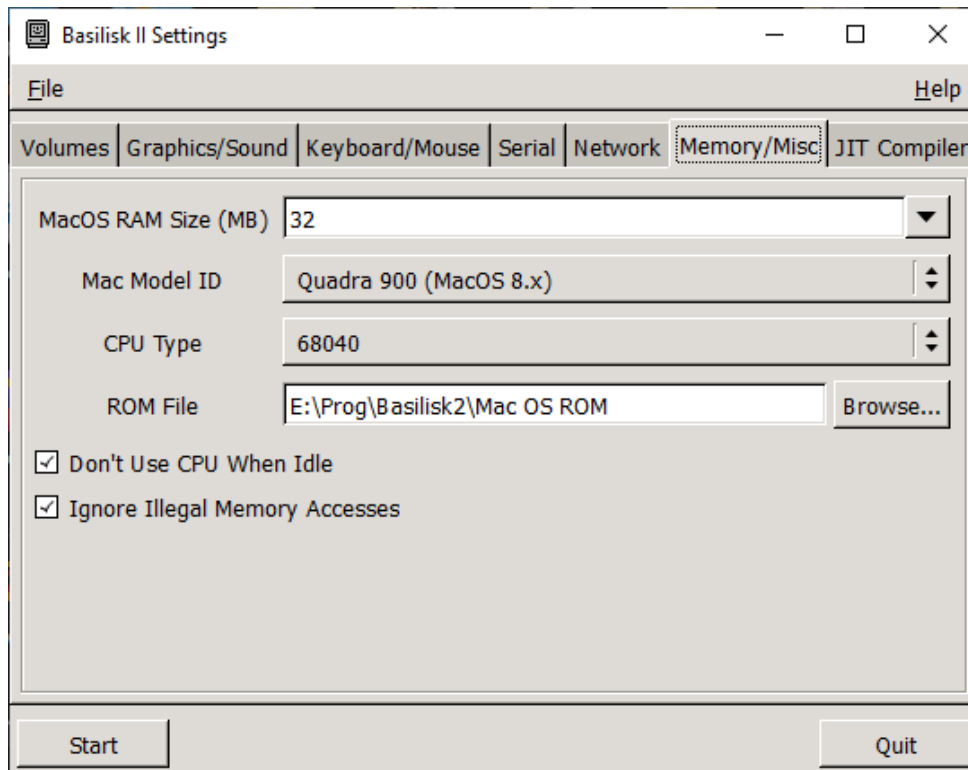


Figure 4. Memory, Model ID and ROM settings in Basilisk II.

Under the tab *Memory/Misc* you need to define your system's total amount of memory (fig. 4). For Basilisk II (68k machine) 16 or 32Mb will be more than enough, for Sheepshaver (PPC machine) 64 or 128Mb will suffice. With Basilisk II you have to enter what machine that the emulator will be emulating. I recommend a **Quadra 900** with **68040** CPU for ease of use. Be aware: that to make most use of 68040 compatibility, the *Mac Model ID* should be set to Quadra 900.

Both Basilisk II and Sheepshaver need a ROM-file – and they aren't included. It's in the ROM where the secret Apple sauce is stored that makes a Macintosh what it is. You have to source one. Basilisk II needs a so called *clean 32-bit* ROM (1 Mb). Sheepshaver gives best compatibility with a so called *Old World* ROM (4 Mb). Download a bunch, and try a couple.

Once you've setup both a boot image and found a suitable ROM file, click *Start*. If everything goes well, you should see a boot screen very soon.

As a comfort adjustment, it could be useful to change the framerate under the *Graphics/Sound* tab to 30Hz or more to get a less choppy user experience.

If you're a Windows user and utilize the malware protection *Controlled Folder Access*, these emulators doesn't work well with that. Even if you give them privileged access they usually can't save the settings and the emulator won't boot as a result. It's easiest to just put the emulators and your images somewhere on your hard drive that's not on your *Protected Folder* list.

GETTING YOUR DRIVE IMAGE ON TO THE BLUESCSI

Getting this to work is remarkable simple. You use one (or more) of Eric Helgeson's pre-formatted blank hard drive images, fill it to your heart's content in one of the mentioned emulators. Name the image file correctly and drag it to a SD card that for the BlueSCSI. Boot your vintage Mac and be amazed how easy it was to get it to work!

Your card needs to be formatted in FAT32 or exFAT, but preferably exFAT. All card formatting software are not created equal, so please use the recommended formatter to avoid most weird and strange problems. Also, a note of caution is to start out with the pre-made 250Mb or 500Mb image just to get things started. An image that's 1Gb and 2Gb large can cause issues with older machines. So it's wise to not go all in before you know it's working.

NAMING YOUR IMAGES

The image's file name tells the BlueSCSI some specifications about the image. A typical file name could looks like this:

```
HD20_512 Mac OS 8.1 US.hda
```

HD It's a hard disk image! As of v1.1a only hard disk images are available.
2 Your disk will have ID 2 on your computer's SCSI bus.
0 This is the Logical Unit Number, LUN. It should always be 0.
512 A traditional hard drive is divided into equally sized sectors. In our case they're
 512 bytes, because that's what the BlueSCSI prefers.
Mac OS 8.1 US A label for the user to remember what's on the image.
.hda Is the preferred file extension for Basilisk II. This doesn't matter for the BlueSCSI.

The filename may not be longer than 32 characters – in total.

THE SCSI BUS

The computer's SCSI bus can have up to 7 different units (hard disks, CD drives, scanners etc) connected at once, numbered 0 to 6. That's also how many drive images you can have on the SD card. The convention is the internal hard disk has the ID 0. So if your plan is to back up your old mechanical hard drive, you need to give your own image another ID. Otherwise your image would be in conflict with the mechanical drive and neither drive will be visible to the computer.

If you're backing up your old mechanical hard drive to your BlueSCSI you might need to consider SCSI termination. This is when you need to consider termination:

- Your BlueSCSI is internal (not DB25 model)
- Your SCSI cable has two connectors for hard drives (and one for the motherboard)
- Your BlueSCSI and mechanical hard drive use the same SCSI cable

If so, put your mechanical drive at the end of the cable and the BlueSCSI in the middle. On the BlueSCSI you remove the two termination jumpers (+5V and GND) that sit on the between the long yellow resistor packs and the Berg-power connector. (Do NOT touch the jumpers near the USB-port! It's possible to erase the emulation program) However, when the BlueSCSI is alone on the cable, you need those termination jumpers installed or the SCSI signal might echo back and forth on the cable and become gibberish.

USEFUL UTILITIES FOR DOWNLOADED VINTAGE FILES

There are a handful of utility programs (*fig. 5*) that all vintage Mac's need to tackle the files that you'll find on the archiving sites of the internet. Because vintage Macintoshes use something called a fork on all its files, the files that you download from the internet will always be packed up using one or more utilities. If your files do lose their forks (say by unpacking them in Windows), then your Macintosh won't know what to do with them. It's therefore recommended that you open the packages inside a Macintosh environment. Another great use of the emulators!



Figure 5. Various utilities.

RECOMMENDED UTILITIES

StuffIt Expander is a stapleware for compressed files on the Macintosh. Most downloaded files will be stuffed. StuffIt Expander can expand a large variety of formats. It's important to be aware that newer versions like 5.5 aren't always compatible with files made with the older version like 4. It's good practice to have both on your computer.

MacZip is considered the one of the better Zip-archiver for Classic Macintoshes. StuffIt can unzip an archive, MacZip is preferred since it's better at retaining the fork. MacZip has no problem reading Zip-files from Windows machines, and create perfectly readable Zip-files for PC's.

Disk Copy was the king of storing images of floppies. v6.1.2 and later can mount images on the desktop. Many program installers will be stored in Disk Copy images. If you intend to archive any of your old 800k disks, then v4.2 is preferred because of how it reads 800k floppies.

Toast is a CD-burner program. But it has the neat trick that it can mount CD images on the desktop. It's not as useful for emulation, since Basilisk II and Sheepshaver can mount the toast-images directly from the startup screen. Toast is a lot more useful on your vintage Mac.

Disinfectant is an antivirus program. Even if you downloaded the install disks, you have no way of knowing where they've been before they were archived. And yes, even Mac's get viruses.

Apple Personal Diagnostics does what it says. It runs diagnostic tests on your vintage Mac. Superb if you've just bought some secondhand memory sticks or you think that your computer have been acting a bit funny lately.

2020 Patch is technically not a utility but a system extension for System 7 – 8.1. The patch helps a vintage Mac to be able to set dates beyond 2019 by shifting the computer's internal calendar from 1920-2019 to 1941-2040.

A FRESHLY INSTALLED OS

Because of reasons, you might want to have a fresh install of the OS on your vintage computer. I personally prefer to have a couple of boot images loaded on my SD card, for maximum compatibility with software. It's especially handy, since you in the menu of Mac OS can change the boot disk (🍏 – Control Panels – Startup disk). A big reason why you should consider a fresh install of the OS is that you can customize as you like and not worry about broken drivers that suck system resources.

You can easily find the Mac OS version of your desire on the *Apple Legacy Recovery CD*. It's possible to search by either computer model or System version (1.0-8.1). The Legacy disk is bootable (7.6.1) so you only need it and an empty drive image to install your OS.

A word of caution: Always keep a backup of important drive images. It's easy to do when it's just a file on a SD card. You get the best experience with the OS if you install it on the actual hardware that you intend to use it on, because the installer configures the OS after your computer's specifications.

SYSTEM 7 & ENABLERS

Apple has coded their OS's so they will only work with a specific range of computer models. This is done to make sure that the hardware is compatible with OS' needs. In many cases the OS was compatible – but the hardware was released *after* the OS was released. Hence the OS was patched model specific with what Apple called *Enablers*. This is mostly relevant to System 7.1. System 7.5 received an universal enabler.

Why even bother with System 7.1 and not just go for 7.5.5 or 7.6.1? Some b&w Macs and low spec'ed Macs will feel quite sluggish under 7.5.5, so 7.1 is a good compromise between speed and compatibility with newer software. System 7.0 isn't very well regarded, hence 7.1.

OTHER LANGUAGES THAN US ENGLISH

Mac OS Anthology contains all language versions of System 7.x till Mac OS 9.x. The Anthology DVD's are written in the Universal Disk Format, UDF, so it's a bit different for the operating system to interpret than old-fashioned CD's. But to access the DVD's you need at least Mac OS 8.1 with the *Adaptec UDF volume access* extension installed (which you put in System folder:Extensions). For Mac OS 8 to work on Basilisk II, it must be set to Quadra 900 and 68040. I've also tried Mac OS 8.6 in Sheepshaver, but that also needed the Adaptec UDF extension. You can easily find US English versions of Mac OS 8.1 & 8.6 to use as a stepping stone.

Although the DVD images can be accessed via Windows and 7zip, you will lose some relevant data if you don't copy the installation images inside a Macintosh environment. So getting the DVD's to work in the emulator is essential.

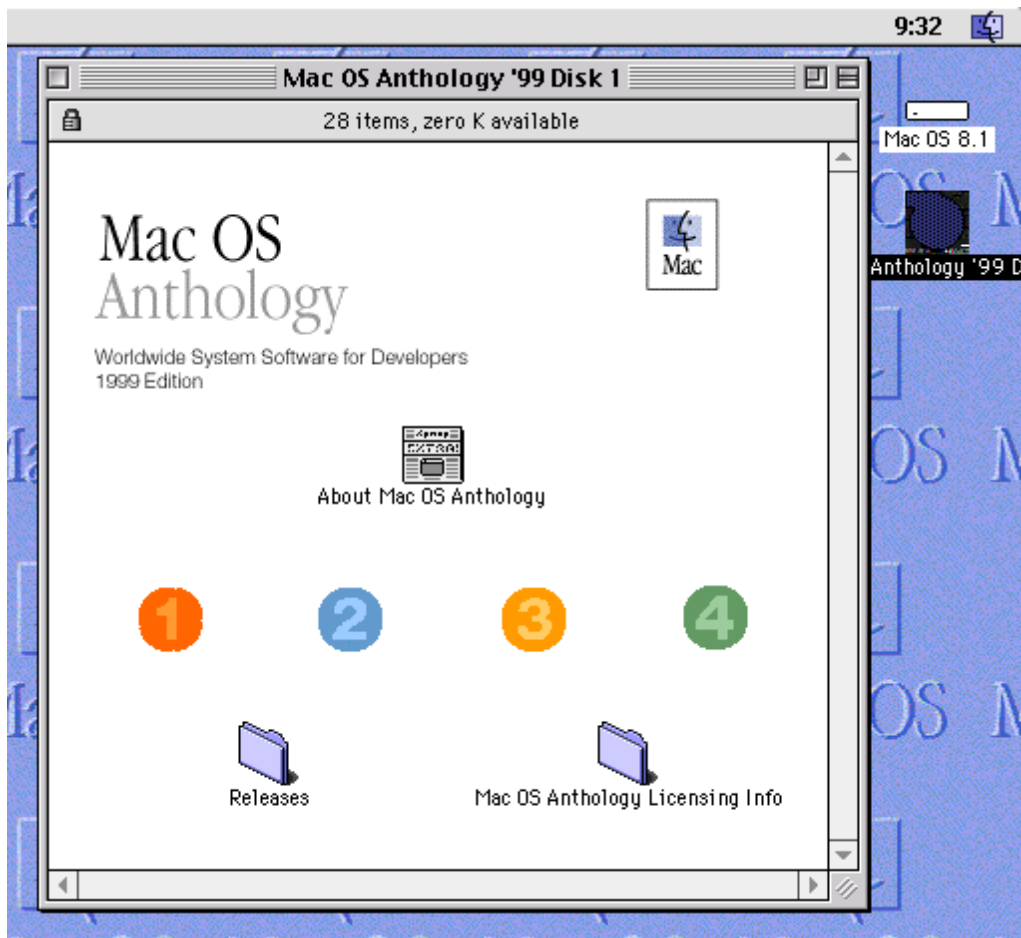


Figure 6. Basilisk II booted in Mac OS 8.1 with an Anthology DVD loaded correctly.

Once you've gotten UDF to work (fig. 6), the DVD image will load perfectly in Basilisk II / Sheepshaver. Open the folder *Releases*, look up the version that you're interested in and pick your language. Copy the image to another disk and mount the image in Disk Copy 6.x to open it. The description on Macintosh Garden will make it seem that it's a lot more hopeless than it actually is.

Content on Anthology disks:

Disk '99 – 01: System 7.0 – Mac OS 8.0

Disk '99 – 05: Mac OS 8.5.1 – 8.6

Disk '99 – 02: Mac OS 8.0 – 8.1

Disk '99 – 06: Mac OS 8.6

Disk '99 – 03: Mac OS 8.1 – 8.5

Disk '00 – 05: Mac OS 9.0 – 9.0.4

Disk '99 – 04: Mac OS 8.5 – 8.5.1

Disk '00 – 06: Mac OS 9.0.4

If you already have Sheepshaver installed and don't want to bother with the UDF extension. You could install an English version of OS 9 and access the Anthology disks that way. But so far I haven't found any install disks with OS 9 that will boot on an emulator. I guess this is more a last resort if nothing else work, since you need some other bootable image (for instance OS 8.1 or 8.6) to install OS 9.

RESOURCES

DRIVERS

2020 Patch

<https://mactcp.net/macos2020.html>

Adaptec UDF extension

<https://macintoshgarden.org/apps/adaptec-udf-volume-access>

OPERATING SYSTEMS

Apple Legacy Recovery CD October 1999

<https://macintoshgarden.org/apps/apple-legacy-software-recovery-cd>

Mac OS Anthology

<https://macintoshgarden.org/apps/mac-os-anthology-99>

Mac OS 8 installation disks

68040 & PPC: <https://macintoshgarden.org/apps/macintosh-system-81-mac-os-81>

PPC: <https://macintoshgarden.org/apps/mac-os-85-851-update>

System 7 - System enablers

<https://macintoshgarden.org/apps/apple-system-enablers>

UTILITIES

Apple Personal Diagnostics

<https://macintoshgarden.org/apps/apple-personal-diagnostics-113>

Disinfectant

<https://macintoshgarden.org/apps/disinfectant>

Disk Copy

v4.2: <https://macintoshgarden.org/apps/disk-copy-42>

v6.x: <https://macintoshgarden.org/apps/disk-copy>

MacZip

<https://macintoshgarden.org/apps/maczip-106>

StuffIt Expander

v4.0.2: <https://macintoshgarden.org/apps/stuffit-expander-402>

v5.5: <https://macintoshgarden.org/apps/stuffit-expander-55>

Toast

68k & PPC: <https://macintoshgarden.org/apps/toast-deluxe-4>

PPC: <https://macintoshgarden.org/apps/toast-5-titanium>

EMULATORS

Download Basilisk II

<https://www.emaculation.com/forum/viewforum.php?f=6>

Download Sheepshaver

<https://www.emaculation.com/forum/viewforum.php?f=20>

Mac ROM's

<https://www.macintoshrepository.org/7038-all-macintosh-roms-68k-ppc->

SOFTWARE ARCHIVES

Macintosh Repository

<https://www.macintoshrepository.org/>

Macintosh Garden

<https://macintoshgarden.org/>

BLUESCSI RELATED

Blank disk images for BlueSCSI

<https://github.com/erichelgeson/BlueSCSI/wiki/Usage#blanks>

SD-card format utility

<https://github.com/erichelgeson/BlueSCSI/wiki/SD-Cards>

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