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[#Copy link](https://ida.interchain.io/tutorials/9-path-to-prod/2-software.html#prepare-the-software-to-run) **Prepare the Software to Run**

To get to production, the first order of business is to build the binary that the nodes will run. If you used Ignite CLI, then you already did this under the hood with the ignite chain serve command.

[#Copy link](https://ida.interchain.io/tutorials/9-path-to-prod/2-software.html#target-platforms) Target platforms

Because you are going to run the nodes on different machines, they may use different operating systems and CPU types. You need to account for that when building the binary. In particular, the computer on which you build may be entirely different from the one on which you eventually run the binary. In the jargon, you need to specify the target platform(s).

What target platforms are available? Because you built your entire blockchain with Go, you can rely on [Go target platforms (opens new window)↗](https://go.dev/doc/install/source#environment) for that. Or a nicely presented one [such as this (opens new window)↗](https://gist.github.com/asukakenji/f15ba7e588ac42795f421b48b8aede63). To get the targets specific to your version of Go, just run:



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$ go tool dist list

For instance, for go version go1.18.3 linux/amd64, it returns:



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aix/ppc64

android/386

android/amd64

android/arm

android/arm64

darwin/amd64

darwin/arm64

dragonfly/amd64

freebsd/386

freebsd/amd64

freebsd/arm

freebsd/arm64

illumos/amd64

ios/amd64

ios/arm64

js/wasm

linux/386

linux/amd64

linux/arm

linux/arm64

linux/mips

linux/mips64

linux/mips64le

linux/mipsle

linux/ppc64

linux/ppc64le

linux/riscv64

linux/s390x

netbsd/386

netbsd/amd64

netbsd/arm

netbsd/arm64

openbsd/386

openbsd/amd64

openbsd/arm

openbsd/arm64

openbsd/mips64

plan9/386

plan9/amd64

plan9/arm

solaris/amd64

windows/386

windows/amd64

windows/arm

windows/arm64

As a side note, some of these platforms are first-class ports of Go while the others are not. If you want to only see the first class ports and have installed the jq tool, you can run:



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$ go tool dist list -json \

| jq -r '.[] | select(.FirstClass) | [.GOOS , .GOARCH] | join("/")'



Notice the GOOS and GOARCH keywords in the command above. You will see them again later.

The list is now much shorter:



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darwin/amd64

darwin/arm64

linux/386

linux/amd64

linux/arm

linux/arm64

windows/386

windows/amd64

Imagine you are going to run the node:

* On regular office Linux boxes, so target linux/amd64.
* Also on AWS EC2 instances with a Graviton processor, so target linux/arm64.
* Validator operators are going to generate their genesis transactions on Mac computers with Intel CPUs, so target darwin/amd64.

[#Copy link](https://ida.interchain.io/tutorials/9-path-to-prod/2-software.html#build-and-package) Build and package

There are several ways to build an executable. Pick the one that works best for your situation.

[#Copy link](https://ida.interchain.io/tutorials/9-path-to-prod/2-software.html#with-go-build) With go build

Your Cosmos blockchain project is at heart a Go project, so you can build it with a go build command.

First, you need to locate your func main(). In fact, you may have more than one. For instance, choose the one in cmd/myprojectd/main.go:



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$ env GOOS=linux GOARCH=amd64 go build -o ./build/myproject-linux-amd64 ./cmd/myprojectd/main.go

$ env GOOS=linux GOARCH=arm64 go build -o ./build/myproject-linux-arm64 ./cmd/myprojectd/main.go

$ env GOOS=darwin GOARCH=amd64 go build -o ./build/myproject-darwin-amd64 ./cmd/myprojectd/main.go

This is all you need to do. If your computer is of the linux/amd64 platform type, you can run:



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$ ./build/myproject-linux-amd64

This should return something you will recognize:



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Stargate CosmosHub App

Usage:

myprojectd [command]

Available Commands:

add-genesis-account Add a genesis account to genesis.json

collect-gentxs Collect genesis txs and output a genesis.json file

config Create or query an application CLI configuration file

...

[#Copy link](https://ida.interchain.io/tutorials/9-path-to-prod/2-software.html#with-ignite) With Ignite

Whether you prepared your project with or without Ignite, you can still [build it with Ignite (opens new window)↗](https://docs.ignite.com/references/cli#ignite-chain-build). To see how to write a build command you can do:



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$ ignite chain build --help

You need to adjust the syntax of targets from linux/amd64 to linux:amd64. Also, to give a path for the built files. In a project made by Ignite, release is already added to the .gitignore so it is as good a choice of build folder as any other.



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$ ignite chain build \

--release.targets linux:amd64 \

--release.targets linux:arm64 \

--release.targets darwin:amd64 \

--output ./release \

--release

This creates zipped files and checksums:



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myproject\_linux\_amd64.tar.gz

myproject\_linux\_arm64.tar.gz

myproject\_darwin\_amd64.tar.gz

release\_checksum

The checksum file contains:



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60669d05ba56104d4d999e147c688b228efee93aad9829c1d8418e4ba318ea56 myproject\_linux\_amd64.tar.gz

2fd5f17498dcc2697a276821a0fa4d24d5d80a924f7a092f2d07b7bdd6b661f8 myproject\_linux\_arm64.tar.gz

67f760ac8964a4abe684ec272b34abb9658b103468a960fced12e4f148030a1e myproject\_darwin\_arm64.tar.gz

If you want to confirm a match between the written checksum values and their calculated values, run:



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$ cd release && sha256sum -c release\_checksum

This should output:



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myproject\_linux\_amd64.tar.gz: OK

myproject\_linux\_arm64.tar.gz: OK

myproject\_darwin\_amd64.tar.gz: OK

The checksum is performed on the zipped file, not the executable itself. This is just as well as you can expect to send the zipped file around. When on the computer where it needs to run, you can unzip it with:



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$ tar xzf myproject\_linux\_amd64.tar.gz

This creates a myprojectd executable file.

[#Copy link](https://ida.interchain.io/tutorials/9-path-to-prod/2-software.html#with-a-makefile) With a Makefile

A [Makefile (opens new window)↗](https://tutorialedge.net/golang/makefiles-for-go-developers/) is just a way to keep track of potentially complex commands and summon them with simpler commands. Create your own Makefile in the root folder of your project with:



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build-all:

GOOS=linux GOARCH=amd64 go build -o ./build/myproject-linux-amd64 ./cmd/myprojectd/main.go

GOOS=linux GOARCH=arm64 go build -o ./build/myproject-linux-arm64 ./cmd/myprojectd/main.go

GOOS=darwin GOARCH=amd64 go build -o ./build/myproject-darwin-amd64 ./cmd/myprojectd/main.go

do-checksum:

cd build && sha256sum myproject-linux-amd64 myproject-linux-arm64 myproject-darwin-amd64 > myproject\_checksum

build-with-checksum: build-all do-checksum



Note the lines that add a checksum file as does Ignite. Also, make sure that if you copy paste you have a Tab before each command and not spaces.

If you do not have it yet, install the make tool. For instance, on Ubuntu:



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$ sudo apt-get install --yes make

With make you can then call a build with checksums with:



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$ make build-with-checksum

If you want to see what a vastly more complex Makefile looks like, head to the [Cosmos Hub's own Makefile (opens new window)↗](https://github.com/cosmos/gaia/blob/main/Makefile).

[#Copy link](https://ida.interchain.io/tutorials/9-path-to-prod/2-software.html#with-a-makefile-within-docker) With a Makefile within Docker

If you do not want to install Go or make on your build computer, and [have Docker (opens new window)↗](https://docs.docker.com/engine/install/), you can:

* Reuse the Makefile from above.
* Pick a Docker image that already has Go 1.18.3 and make. [golang:1.18.3 (opens new window)↗](https://hub.docker.com/layers/golang/library/golang/1.18.3/images/sha256-ea66badd7cf7b734e2484a1905b6545bd944ef3bdeea18be833db3e2219f1153?context=explore) is a good choice.

Run the command:



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$ docker run --rm -it \

-v $(pwd):/myproject \

-w /myproject \

golang:1.18.3 \

make build-with-checksum

[#Copy link](https://ida.interchain.io/tutorials/9-path-to-prod/2-software.html#deploy) Deploy

**To keep? To modify?**

Eventually, you will run these executables on computers. The command will be a perhaps-complex version of:



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$ myprojectd start

By default, CometBFT and the Cosmos app are launched together, run together, and communicate via sockets. This is the recommended way of launching. It is not the only way of launching, though.

You can launch CometBFT and the Cosmos app separately, and even on different computers. If you do so, ensure that only your CometBFT app can contact the Cosmos app on the ABCI.

For instance:

* To start only the CometBFT node, run:



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$ myprojectd start --proxy\_app tcp://192.168.0.5:26658

Where 192.168.0.5 is the address where you launch the Cosmos app.

* To start only the Cosmos app, you run:



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$ myprojectd start --with-tendermint=false --abci grpc --address tcp://192.168.0.5:26658

Again, this is not recommended for performance reasons - for example, due to network latency.



If you would like to see how to apply what you've learned, you can go straight to the exercise in [Simulate production in Docker](https://ida.interchain.io/hands-on-exercise/4-run-in-prod/1-run-prod-docker.html) to start from scratch.

More specifically, you can jump to:

* [Docker elements](https://ida.interchain.io/hands-on-exercise/4-run-in-prod/1-run-prod-docker.html#docker-elements), to see how to compile the necessary software.

synopsis

To summarize, this section has explored:

* How to build the binary that the nodes will run, using go build, Ignite CLI, a Makefile, or a Makefile within Docker.
* Different methods of deploying, such as by launching CometBFT and the Cosmos app simultaneously, or by starting either one independently of the other.
* The importance of ensuring the binary will run equally well on computers using different OS and CPU types.

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