[](https://ida.interchain.io/)

[Interchain Developer Academy](https://ida.interchain.io/)/[Interchain Developer Academy](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)



Search

[Interchain Developer Academy](https://ida.interchain.io/)[Interchain Developer Academy](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

Search



Filters

Interchain Developer Academy

[](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Week 0 - Getting Started](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Getting Started](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Blockchain 101](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Blockchain History](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Public and Managed Blockchains](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Consensus in Distributed Networks](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Cryptography](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Self-Assessment Quiz](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Go Introduction - First Steps](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Go Basics](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Go Interfaces](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Control Structures in Go](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Arrays and Slices in Go](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Standard Packages in Go](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Concurrency in Go](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Good-To-Know Dev Terms](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Docker Introduction](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Week 1 - Introduction to the Interchain](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Introduction to the Interchain](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Blockchain Technology and the Interchain](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[The Interchain Ecosystem](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Getting ATOM and Staking It](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[A Blockchain App Architecture](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Accounts](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Transactions](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Messages](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Modules](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Protobuf](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Multistore and Keepers](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[BaseApp](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Queries](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Events](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Context](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Testing](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Relaying with IBC](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Interchain Security](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Bridges](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Migrations](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Week 1 Quiz](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Week 2 - First Steps](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[First Steps](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Setup Your Work Environment](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Run a Node, API, and CLI](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Ignite CLI](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Exercise - Make a Checkers Blockchain](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Store Object](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Create Custom Messages](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Create and Save a Game Properly](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Add a Way to Make a Move](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Emit Game Information](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Record the Game Winner](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Week 2 Exercise](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Week 3 - Introduction to IBC and CosmJS](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Introduction to IBC and CosmJS](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[What is IBC?](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[IBC/TAO - Connections (OPTIONAL)](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[IBC/TAO - Channels (OPTIONAL)](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[IBC/TAO - Clients (OPTIONAL)](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[IBC Token Transfer](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Interchain Accounts (OPTIONAL)](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[IBC Middleware (OPTIONAL)](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Create a Custom IBC Middleware (OPTIONAL)](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Integrate IBC Middleware Into a Chain (OPTIONAL)](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[IBC Tooling](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[What is CosmJS?](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Your First CosmJS Actions](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Compose Complex Transactions](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Learn to Integrate Keplr](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Create Custom CosmJS Interfaces](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Week 4 - Ignite CLI and IBC Advanced](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Ignite CLI and IBC Advanced](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Keep an Up-To-Date Game Deadline](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Keep Track Of How Many Moves Have Been Played](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Put Your Games in Order](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Auto-Expiring Games](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Let Players Set a Wager](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Handle wager payments](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Integration tests](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Incentivize Players](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Help Find a Correct Move](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Play With Cross-Chain Tokens](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Understand IBC Denoms](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Go Relayer](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Hermes Relayer](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Week 5 - CosmJS Advanced](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[CosmJS Advanced](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Create Custom Objects](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Create Custom Messages](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Get an External GUI](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Integrate CosmJS and Keplr](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Backend Script for Game Indexing](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Week 6 - IBC Deep Dive](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[IBC Deep Dive](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[IBC Application Developer Introduction](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Make a Module IBC-Enabled](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Adding Packet and Acknowledgment Data](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Extend the Checkers Game With a Leaderboard](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Create a Leaderboard Chain](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Week 7 - From Code to MVP to Production and Migrations](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[From Code to MVP to Production and Migrations](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Run in Production](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Prepare the Software to Run](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Prepare a Validator and Keys](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Prepare Where the Node Starts](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Prepare and Connect to Other Nodes](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Configure, Run, and Set Up a Service](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Prepare and Do Migrations](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Simulate Production in Docker](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Tally Player Info After Production](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Add a Leaderboard as a Module](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Migrate the Leaderboard Module After Production](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Simulate a Migration in Docker](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Final Exam](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[What's Next?](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

[Continue Your Interchain Journey](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html)

Docs Version Switcher

On this page

[Some initial thoughts](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#some-initial-thoughts)

[Code needs](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#code-needs)

[Create the message](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#create-the-message)

[Protobuf objects](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#protobuf-objects)

[Protobuf service interface](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#protobuf-service-interface)

[Unit tests](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#unit-tests)

[Interact via the CLI](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#interact-via-the-cli)

[#Copy link](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#create-custom-messages) **Create Custom Messages**



Make sure you have everything you need before proceeding:

* You understand the concepts of [transactions](https://ida.interchain.io/academy/2-cosmos-concepts/3-transactions.html), [messages](https://ida.interchain.io/academy/2-cosmos-concepts/4-messages.html), and [Protobuf](https://ida.interchain.io/academy/2-cosmos-concepts/6-protobuf.html).
* Go is installed.
* You have the checkers blockchain scaffold with the StoredGame and its helpers. If not, follow the [previous steps](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/3-stored-game.html) or check out the [relevant version (opens new window)↗](https://github.com/cosmos/b9-checkers-academy-draft/tree/full-game-object).



In this section, you will:

* Create a game Protobuf object.
* Create a game Protobuf service interface.
* Extend your unit tests.
* Interact via the CLI.

You have created your game object type and have decided how to lay games in storage. Time to make it possible for participants to create games.

[#Copy link](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#some-initial-thoughts) Some initial thoughts

Because this operation changes the state, it has to originate from transactions and messages. Your module receives a message to create a game - what should go into this message? Questions that you have to answer include:

* Who is allowed to create a game?
* Are there any limitations to creating games?
* Given that a game involves two players, how do you prevent coercion and generally foster good behavior?
* Do you want to establish leagues?

Your implementation does not have to answer everything immediately, but you should be careful that decisions made now do not impede your own future plans or make things more complicated later.

Keep it simple: a single message should be enough to create a game.

[#Copy link](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#code-needs) Code needs

As before:

* What Ignite CLI commands will create your message?
* How do you adjust what Ignite CLI created for you?
* How would you unit-test your addition?
* How would you use Ignite CLI to locally run a one-node blockchain and interact with it via the CLI to see what you get?

Run the commands, make the adjustments, run some tests. **Create the message only**, do not create any games in storage for now.

[#Copy link](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#create-the-message) Create the message

Currently:

* Your game objects have been defined in storage.
* You prevented a simple CRUD to set the objects straight from transactions.

Now you need a message to instruct the checkers blockchain to create a game. This message needs to:

* Not specify the ID of the game, because the system uses an incrementing counter. However, the server needs to return the newly created ID value, since the eventual value cannot be known before the transaction is included in a block and the state computed. Call this gameIndex.
* Not specify the game board as this is controlled by the checkers rules.
* Specify who is playing with the black pieces. Call the field black.
* Specify who is playing with the red pieces. Call the field red.

Instruct Ignite CLI to do all of this:

**Local**

**Docker**



Copy

$ ignite scaffold message createGame black red \

--module checkers \

--response gameIndex

Copy

$ docker run --rm -it \

-v $(pwd):/checkers \

-w /checkers \

checkers\_i \

ignite scaffold message createGame black red \

--module checkers \

--response gameIndex

This creates a [certain number of files (opens new window)↗](https://github.com/cosmos/b9-checkers-academy-draft/commit/66ae6e1) plus [some GUI elements (opens new window)↗](https://github.com/cosmos/b9-checkers-academy-draft/commit/0365f55).

[#Copy link](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#protobuf-objects) Protobuf objects

Simple Protobuf objects are created:



Copy

message MsgCreateGame {

string creator = 1;

string black = 2;

string red = 3;

}

message MsgCreateGameResponse {

string gameIndex = 1;

}

proto /

checkers /

tx.proto

[View source→](https://github.com/cosmos/b9-checkers-academy-draft/blob/create-game-msg/proto/checkers/tx.proto" \l "L14-L22" \t "_blank)

When compiled, for instance with ignite generate proto-go, these yield:



Copy

type MsgCreateGame struct {

Creator string `protobuf:"bytes,1,opt,name=creator,proto3" json:"creator,omitempty"`

Black string `protobuf:"bytes,2,opt,name=black,proto3" json:"black,omitempty"`

Red string `protobuf:"bytes,3,opt,name=red,proto3" json:"red,omitempty"`

}

x /

checkers /

types /

tx.pb.go

[View source→](https://github.com/cosmos/b9-checkers-academy-draft/blob/create-game-msg/x/checkers/types/tx.pb.go" \l "L30-L34" \t "_blank)

And:



Copy

type MsgCreateGameResponse struct {

GameIndex string `protobuf:"bytes,1,opt,name=gameIndex,proto3" json:"gameIndex,omitempty"`

}

x /

checkers /

types /

tx.pb.go

[View source→](https://github.com/cosmos/b9-checkers-academy-draft/blob/create-game-msg/x/checkers/types/tx.pb.go" \l "L90-L92" \t "_blank)



Files were generated to serialize the pair which are named \*.pb.go. You should not edit these files.

Ignite CLI also registered MsgCreateGame as a concrete message type with the two (de-)serialization engines:



Copy

func RegisterCodec(cdc \*codec.LegacyAmino) {

cdc.RegisterConcrete(&MsgCreateGame{}, "checkers/CreateGame", nil)

}

x /

checkers /

types /

codec.go

[View source→](https://github.com/cosmos/b9-checkers-academy-draft/blob/create-game-msg/x/checkers/types/codec.go" \l "L11" \t "_blank)

And:



Copy

func RegisterInterfaces(registry cdctypes.InterfaceRegistry) {

registry.RegisterImplementations((\*sdk.Msg)(nil),

&MsgCreateGame{},

)

...

}

x /

checkers /

types /

codec.go

[View source→](https://github.com/cosmos/b9-checkers-academy-draft/blob/create-game-msg/x/checkers/types/codec.go" \l "L16-L18" \t "_blank)

This is code that you probably do not need to change.

Ignite CLI also creates boilerplate code to have the message conform to the [sdk.Msg (opens new window)↗](https://github.com/cosmos/cosmos-sdk/blob/9fd866e3820b3510010ae172b682d71594cd8c14/types/tx_msg.go#L11-L33) type:



Copy

func (msg \*MsgCreateGame) GetSigners() []sdk.AccAddress {

creator, err := sdk.AccAddressFromBech32(msg.Creator)

if err != nil {

panic(err)

}

return []sdk.AccAddress{creator}

}

x /

checkers /

types /

message\_create\_game.go

[View source→](https://github.com/cosmos/b9-checkers-academy-draft/blob/create-game-msg/x/checkers/types/message_create_game.go" \l "L28-L34" \t "_blank)

This code is created only once. You can modify it as you see fit.

[#Copy link](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#protobuf-service-interface) Protobuf service interface

Ignite CLI also adds a new function to your gRPC interface that receives all transaction messages for the module, because the message is meant to be sent and received. The interface is called service Msg and is declared inside proto/checkers/tx.proto.



Ignite CLI creates this [tx.proto (opens new window)↗](https://github.com/cosmos/b9-checkers-academy-draft/blob/stored-game/proto/checkers/tx.proto) file at the beginning when you scaffold your project's module. Ignite CLI separates different concerns into different files so that it knows where to add elements according to instructions received. Ignite CLI adds a function to the empty service Msg with your instruction.

The new function receives this MsgCreateGame, namely:



Copy

service Msg {

rpc CreateGame(MsgCreateGame) returns (MsgCreateGameResponse);

}

proto /

checkers /

tx.proto

[View source→](https://github.com/cosmos/b9-checkers-academy-draft/blob/create-game-msg/proto/checkers/tx.proto" \l "L10" \t "_blank)

As an interface, it does not describe what should happen when called. With the help of Protobuf, Ignite CLI compiles the interface and creates a default Go implementation.

[#Copy link](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#unit-tests) Unit tests

The code of this section was created by Ignite CLI, so there is no point in testing it. However, since you are going to adjust the keeper to do what you want, you should add a test file for that.

First, recall your address constants in the keeper\_test package:



Copy

package keeper\_test

import "github.com/b9lab/checkers/x/checkers/testutil"

const (

alice = testutil.Alice

bob = testutil.Bob

carol = testutil.Carol

)

x /

checkers /

keeper /

common\_test.go

[View source→](https://github.com/cosmos/b9-checkers-academy-draft/blob/create-game-msg/x/checkers/keeper/common_test.go" \t "_blank)

Next, create a new keeper/msg\_server\_create\_game\_test.go, declared with package keeper\_test:



Copy

func TestCreateGame(t \*testing.T) {

msgServer, context := setupMsgServer(t)

createResponse, err := msgServer.CreateGame(context, &types.MsgCreateGame{

Creator: alice,

Black: bob,

Red: carol,

})

require.Nil(t, err)

require.EqualValues(t, types.MsgCreateGameResponse{

GameIndex: "", // TODO: update with a proper value when updated

}, \*createResponse)

}

x /

checkers /

keeper /

msg\_server\_create\_game\_test.go

[View source→](https://github.com/cosmos/b9-checkers-academy-draft/blob/create-game-msg/x/checkers/keeper/msg_server_create_game_test.go" \t "_blank)

You can test this with:

**Local**

**Docker**



Copy

$ go test github.com/alice/checkers/x/checkers/keeper

Copy

$ docker run --rm -it \

-v $(pwd):/checkers \

-w /checkers \

checkers\_i \

go test github.com/alice/checkers/x/checkers/keeper

This convenient [setupMsgServer (opens new window)↗](https://github.com/cosmos/b9-checkers-academy-draft/blob/create-game-msg/x/checkers/keeper/msg_server_test.go#L13-L16) function was created by Ignite CLI. To call this a *unit* test is a slight misnomer because the msgServer created uses a real context and keeper, although with a [memory database (opens new window)↗](https://github.com/cosmos/b9-checkers-academy-draft/blob/create-game-msg/testutil/keeper/checkers.go#L24), not mocks.

[#Copy link](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#interact-via-the-cli) Interact via the CLI

First, run the chain:

**Local**

**Docker**



Copy

$ ignite chain serve

Copy

$ docker run --rm -it \

--name checkers \

-v $(pwd):/checkers \

-w /checkers \

checkers\_i \

ignite chain serve

Time to see which new CLI command was created by Ignite CLI. In another shell:

**Local**

**Docker**



Copy

$ checkersd tx checkers --help

Copy

$ docker exec -it checkers \

checkersd tx checkers --help

Among other things, this informs you of the following:



Copy

...

Available Commands:

create-game Broadcast message createGame

And also:

**Local**

**Docker**



Copy

$ checkersd tx checkers create-game --help

Copy

$ docker exec -it checkers \

checkersd tx checkers create-game --help

This returns:



Copy

...

Usage:

checkersd tx checkers create-game [black] [red] [flags]

Flags:

-a, --account-number uint The account number of the signing account (offline mode only)

-b, --broadcast-mode string Transaction broadcasting mode (sync|async|block) (default "sync")

--dry-run Ignore the --gas flag and perform a simulation of a transaction, but don't broadcast it

--fee-account string Fee account pays fees for the transaction instead of deducting from the signer

--fees string Fees to pay along with transaction; eg: 10uatom

--from string Name or address of private key with which to sign

--gas string Gas limit to set per-transaction; set to "auto" to calculate sufficient gas automatically (default 200000)

...

You kept the two accounts created by Ignite CLI.

Have alice start a game with bob.



Instead of having to copy and paste the addresses each time you need them, you can store these as variables:

**Local**

**Docker**



Copy

$ export alice=$(checkersd keys show alice -a)

$ export bob=$(checkersd keys show bob -a)

Copy

$ export alice=$(docker exec checkers checkersd keys show alice -a)

$ export bob=$(docker exec checkers checkersd keys show bob -a)

docker is called without -it, otherwise it would add a \r to the addresses.

You will have to redo this for every new shell, and for every use of the --reset-once flag.

How much gas is needed? You can get an estimate by dry running the transaction using the --dry-run flag:

**Local**

**Docker**



Copy

$ checkersd tx checkers create-game $alice $bob --from $alice --dry-run

Copy

$ docker exec -it checkers \

checkersd tx checkers create-game $alice $bob --from $alice --dry-run

It appears the dry-run function is broken in this version. It if were not, it would print:



Copy

gas estimate: 40452

It is hard to assess how much gas that represents. In any case, keep gas on auto:

**Local**

**Docker**



Copy

$ checkersd tx checkers create-game $alice $bob --from $alice --gas auto

Copy

$ docker exec -it checkers \

checkersd tx checkers create-game $alice $bob --from $alice --gas auto

****

**The command prints a lot and prompts you for confirmation**

Note how it also prints the gas estimate:



Copy

gas estimate: 43032

{"body":{"messages":[{"@type":"/alice.checkers.checkers.MsgCreateGame","creator":"cosmos169mc8qqd6tlued00z23fs75tyecfcazpuwapc4","black":"cosmos169mc8qqd6tlued00z23fs75tyecfcazpuwapc4","red":"cosmos10mqyvj55hm4wunsd62wprwfv9ehcerkfghcjfl"}],"memo":"","timeout\_height":"0","extension\_options":[],"non\_critical\_extension\_options":[]},"auth\_info":{"signer\_infos":[],"fee":{"amount":[],"gas\_limit":"43032","payer":"","granter":""}},"signatures":[]}

confirm transaction before signing and broadcasting [y/N]: y

code: 0

codespace: ""

data: 0A280A262F62396C61622E636865636B6572732E636865636B6572732E4D736743726561746547616D65

events:

- attributes:

- index: true

key: ZmVl

value: ""

type: tx

- attributes:

- index: true

key: YWNjX3NlcQ==

value: Y29zbW9zMTY5bWM4cXFkNnRsdWVkMDB6MjNmczc1dHllY2ZjYXpwdXdhcGM0LzE=

type: tx

- attributes:

- index: true

key: c2lnbmF0dXJl

value: b1MwcWNrZEtPayt5UlNHdUtNbXZmdFViTjJZbkRTcER0RnNGZVNBais5WWQrQk9vYnRxdHh4Ylp6ZUlib29qd0VNR1BWS1l5Mkg1eHJ3VEZhQ0R5R3c9PQ==

type: tx

- attributes:

- index: true

key: YWN0aW9u

value: Y3JlYXRlX2dhbWU=

type: message

gas\_used: "41078"

gas\_wanted: "43032"

height: "1598"

info: ""

logs:

- events:

- attributes:

- key: action

value: create\_game

type: message

log: ""

msg\_index: 0

raw\_log: '[{"events":[{"type":"message","attributes":[{"key":"action","value":"create\_game"}]}]}]'

timestamp: ""

tx: null

txhash: 576C303E3C43B409B0DEA1CBFF18B7F34F1E69492EE8A562751668117E42834B

If you are curious, the .events.attributes are encoded in Base64:

**Local**

**Docker**



Copy

$ echo YWN0aW9u | base64 -d

$ echo Y3JlYXRlX2dhbWU= | base64 -d

Copy

$ docker exec -it checkers \

bash -c "echo YWN0aW9u | base64 -d"

$ docker exec -it checkers \

bash -c "echo Y3JlYXRlX2dhbWU= | base64 -d"

Return respectively:



Copy

action%

create\_game%

Which can be found again in .raw\_log.



**Troubleshooting - key not found**

On some systems, you may encounter errors stating *keys not found*. First verify that you do indeed have the correct addresses; if this is the case, then the errors may be because one command uses keyring A while another command uses keyring B. Keyrings do not share keys, so this can explain the error message.

In this situation, you may need to specify your preferred keyring explicitly so that it is consistent across commands. For instance:

* When creating keys:

**Local**

**Docker**



Copy

$ checkersd keys add alice --keyring-backend test

$ checkersd keys add bob --keyring-backend test

Copy

$ docker exec checkers checkersd keys add alice --keyring-backend test

$ docker exec checkers checkersd keys add bob --keyring-backend test

* When collecting keys:

**Local**

**Docker**



Copy

$ export alice=$(checkersd keys show alice -a --keyring-backend test)

$ export bob=$(checkersd keys show bob -a --keyring-backend test)

Copy

$ export alice=$(docker exec checkers checkersd keys show alice -a --keyring-backend test)

$ export bob=$(docker exec checkers checkersd keys show bob -a --keyring-backend test)

docker is called without -it, otherwise it would add a \r to the addresses.

* When sending a transaction:

**Local**

**Docker**



Copy

$ checkersd tx \

checkers create-game \

$alice $bob \

--from $alice \

--gas auto \

--keyring-backend test

Copy

$ docker exec -it checkers \

checkersd tx \

checkers create-game \

$alice $bob \

--from $alice \

--gas auto \

--keyring-backend test

You can query your chain to check whether the system info remains unchanged:

**Local**

**Docker**



Copy

$ checkersd query checkers show-system-info

Copy

$ docker exec -it checkers \

checkersd query checkers show-system-info

This returns:



Copy

SystemInfo:

nextId: "1"

It remains unchanged.

Check whether any game was created:

**Local**

**Docker**



Copy

$ checkersd query checkers list-stored-game

Copy

$ docker exec -it checkers \

checkersd query checkers list-stored-game

This returns:



Copy

pagination:

next\_key: null

total: "0"

storedGame: []

It appears that nothing changed. Ignite CLI created a message, you even signed and broadcast one. However you have not yet implemented what actions the chain should undertake when it receives this message.

When you are done with this exercise you can stop Ignite's chain serve.

synopsis

To summarize, this section has explored:

* How to make it possible for participants of the checkers blockchain game to create games with a single message, using a Protobuf object and a Protobuf service interface.
* Which elements must be specified (and which must not) when instructing Ignite CLI to send a game creation message.
* How to add a test file to check the functionality of your code.
* How to interact via the CLI to confirm the "create a game" message occurs as intended - though the absence of a dedicated Message Handler means that currently no game is created.

previous

[](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/3-stored-game.html)

**[Store Object](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/3-stored-game.html)**

up next

**[Create and Save a Game Properly](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/5-create-handling.html)**

[[](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/5-create-handling.html)](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/5-create-handling.html)

Rate this Page

icon smile

icon meh

icon frown

Would you like to add a message?

Submit

Thank you for your Feedback!

On this page

[Some initial thoughts](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#some-initial-thoughts)

[Code needs](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#code-needs)

[Create the message](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#create-the-message)

[Protobuf objects](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#protobuf-objects)

[Protobuf service interface](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#protobuf-service-interface)

[Unit tests](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#unit-tests)

[Interact via the CLI](https://ida.interchain.io/hands-on-exercise/1-ignite-cli/4-create-message.html#interact-via-the-cli)

#### **Get Cosmos updates**

Unsubscribe at any time. [Privacy Policy↗](https://v1.cosmos.network/privacy)

     Next

Documentation

[Cosmos SDK](https://docs.cosmos.network/)[Cosmos Hub](https://hub.cosmos.network/)[CometBFT](https://docs.cometbft.com/)[IBC Protocol](https://ibc.cosmos.network/)

Community

[Interchain blog](https://blog.cosmos.network/)[Forum](https://forum.cosmos.network/)[Discord](https://discord.gg/cosmosnetwork)

Contributing

[Source code on GitHub](https://github.com/cosmos/sdk-tutorials)

[](https://ida.interchain.io/)

[Interchain Developer Academy](https://ida.interchain.io/)

**[](https://blog.cosmos.network/)[](https://twitter.com/cosmos)[](https://discord.gg/cosmosnetwork)[](https://www.linkedin.com/company/interchain-foundation/about/)[](https://reddit.com/r/cosmosnetwork)[](https://t.me/cosmosproject)[](https://www.youtube.com/c/CosmosProject)**



Dark mode

† This website is maintained by the Interchain Foundation (ICF). The contents and opinions of this website are those of the ICF. The ICF provides links to cryptocurrency exchanges as a service to the public. The ICF does not warrant that the information provided by these websites is correct, complete, and up-to-date. The ICF is not responsible for their content and expressly rejects any liability for damages of any kind resulting from the use, reference to, or reliance on any information contained within these websites.

Cosmos is a registered trademark of the [Interchain Foundation.](https://interchain.io/)[Privacy](https://v1.cosmos.network/privacy)