Handbook Dedicated Servers - Memories of Mars

`Version 1.12`

Introduction

The Memories of Mars Dedicated Server is available via Steam as a Dedicated Server. It can be hosted by players who do not own the game themselves as well as on dedicated servers which can log into Steam anonymously.

The server is available for Windows and Linux 64 bit versions.

Changelog

Handbook Version	Game Version	Changes

1.8	1.7.0 EA	For Season 7 we switched our whole networking backend from SteamSDK to Photon. This should bring a much more reliable networking performance and stability, as well as less bugs and connection issues with private servers. Due to this, no port-handling is required anymore and port-forwarding should also happen automatically with Photon's NAT punch-through systems. All now obsolete parameters have been crossed out in the sections below.
		If for some reason port-forwarding is required in your setup, follow the guide here to find out which ports to open for Photon: https://doc.photonengine.com/en-us/realtime/current/connection-and-authentication/tcp-and-udp-port-numbers
		As Photon does not support full LAN servers, we had to remove the button "Join LAN Server" temporarily from the Main Menu (it is right now not possible for us to detect if a local server is running. We are working on fixing this). You can still find your local servers in the server browser and can still run private servers for solo play as before.
		We also introduced a new account system, which does not rely on SteamIDs anymore. We now have our own IDs, which can be used to identify users. Therefore you need to adjust the "Admins" field in your server config with your new ID, to be able to use admin commands and cheats. You can find your ID in the upper right corner of the main menu of the game. You can also look up the ID of other players in the Player List of the admin panel.
		There was also the requirement added, that the number of building ranks in the CustomRuleset can not be changed and must remain at exactly 6 entries. Any other amount will cause the building rank configuration to be ignored and defaults will be used.
1.9	1.7.5 EA	Added flag "PhotonSendDirect" to DedicatedServerConfig. This variable might help with lag issues on private servers, but can cause random disconnects when connecting over the internet.
1.10	1.7.6 EA	Added flag "BuildingPreventionSphereRadius" to BuildingRules to adjust the radius around each building part in which no other building can be built.
1.11	1.8.0 EA	We observed network issues with the previous networking setup and have worked towards a new system. This brings back the need for potentially using the multihome setting and port forwarding. LAN servers with a private IP address are currently not possible, we will work on enabling this feature.

| 1.12 | 1.1.0 | We implemented LAN detection for servers into our backend. That means that if you want to connect to a server in your local network or your own machine, you don't have to take care of port-forwarding or using the "multihome" argument anymore. As long as your networking setup is not very complicated (a computer connected to a router connected to the internet, like 90% of players, was our target setup), the absolute minimum you have to do is give your server a ServerName and a ServerID and start it. You should be able to see and connect to it without issues.

This will be further improved with easier setup for public-facing servers as well. This didn't make it into the patch unfortunately, but will be delivered in one of the first few patches after this one. |

Requirements

The server currently has the following requirements:

CPU	The server should have 2 cores/hyperthreads (we made changes to the stock Unreal Engine 4 that allows the game server to run multithreaded). The higher the CPU frequency the better.
Memory	~5 GB during normal operation
Disk	The server is around 3 GB, but this can grow depending on logs and the file-based database
Internet-Connection	The server needs an ongoing connection to the internet with a a recommended upspeed of 200kb/s for the best experience in online play. The ports 7777 and 15000 (configurable) need to be publicly available.

Installation

Via Steam GUI

You can find the dedicated server in your Steam library as "Memories of Mars - Dedicated Server" in the Tools category if you own Memories of Mars. You can install it the same way as any other game on Steam.

Via `steamcmd`

For dedicated servers and platforms without a graphical user interface, you can use Valve's steamcmd tool to install the dedicated server. You don't have to own Memories of Mars to run servers using this method!

Use the following steps to install the dedicated server via steamcmd

1. Make sure you are not logged in as `root` on Linux. The server will not start when root rights are detected.
2. Download `steamcmd` (see https://developer.valvesoftware.com/wiki/SteamCMD#Package_from_repositories)
   a. Probably easiest with something like `sudo apt-get install steamcmd`
3. Start steamcmd by typing `steamcmd`
4. If it is required that you login (valid until the server has been released), login using `login <username>`
5. Unless you want to install to the default directory, choose your install directory by using `force_install_dir`.
6. Download the server by issuing `app_update 897590`

Updating

While Memories of Mars is in Early Access, there will be quite frequent updates. The game client will always be updated to the latest version

via Steam. Most patches during Early access will break compatibility of existing clients with the servers due to major code and content changes being made, therefore, the dedicated server will have to be updated in order to see servers. If you don't see your dedicated server in the Steam server browser or in-game, make sure it has the same version as the game client.

If you installed your Dedicated Server via the Steam UI, just wait for the update to be applied.

If you installed via `steamcmd`, use the same command again to update the server to the latest state:

```
app_update 897590
```

Database-breaking patches

We are taking care that no database-breaking changes are put into the server code during a season of Memories of Mars. If, for some reason, we have to patch the database itself, we will announce this beforehand in patch notes.

To make sure you are up to date with the information about the game and upcoming patches, please follow the news on the Steam page (https://steamcommunity.com/app/644290) of the game and join our Discord (https://discord.gg/7c6rvnv).

Configuring a server

Your private server is configurable via the file `DedicatedServerConfig.cfg` that you can find in the main folder where Steam downloaded the private server to. The following is an example file:

```
{
 "ServerName": "My Private Server",
 "ServerPassword": "password123",
 "ServerID": "PS_01",
 "MapName": "Main",
 "MaxPlayers": 2,
 "EnablePVP": false,
 "EnablePVPAreas": true,
 "EnableEAC": true,
 "DailyRestartUTCHour": "12",
 "Headless": false,
 "UserWhitelist": "",
 "UserBlacklist": "",
 "Admins": "13374213374213370",
 "PhotonSendDirect": false
}
```

The available fields are:

Name	Type	Example	Required	Comments
ServerName	String	My Private Server	Yes	This is the server name that you will find the server under in the in-game Server Browser or in the Steam Server Browser.
ServerPassword	String	password123	No	The password for your server. If not specified (or empty string), this will create a non-password protected server.
ServerID	String	MyServer1	Yes	By changing this, you can switch between different versions of the database (see section on database management).

MapName	String	Main	No	This must be set to Main, so leave the default.
MaxPlayers	Integer	2	No	Maximal number of players for the server. Default is 64.
EnablePVP	Boolean	false	No	If set to true, the server will be a full PVP server. If set to false, the server will be PVE. If not present, will default to PVP.
EnablePVPAreas	Boolean	true	No	If set to true, this enables PVP areas around hotspots with active FLOPs events. If not present, defaults to having PVP areas on PVE servers. Has no effect on a PVP server.
EnableEAC	Boolean	true	No	If enabled, the server will be secured with EasyAntiCheat. If not present, defaults to having EasyAntiCheat on.
DailyRestartUTCHour	String	12	No	This will issue two restarts of the server: - The indicated hour (UTC+0) on the hour. - The indicated hour (UTC+0) plus 12 hours on the hour. Times are specified in the 24 hour system. Daily restarts are necessary for server stability and for countering floating-point issues.
Headless	Boolean	false	No	If set to true, this will not open a window with log outputs. Defaults to true if not present.

UserWhitelist	Array of Strings	"12345678910111213|13121110987654321"	No	A whitelist for the server. If there is any entry here, only the ~~Steam~~ IDs thats are in this list are allowed to join the server. This way you can allow only a couple of people to join the server. If there are multiple entries here the IDs have to be separated by using "|". ~~For finding the Steam ID of another user, please use the following guide: https://steamcommunity.com/sharedfiles/filedetails/?id=200000244~~ Since 1.7.0 we have our own account system. You don't put Steam IDs into this field anymore, but Mars Account IDs, which you can find in the upper right corner of the main menu of the game. You can also look up the ID of other players in the Player List of the admin panel.
UserBlacklist	Array of Strings	"12345678910111213|13121110987654321"	No	A blacklist for the server. If a ~~Steam~~ ID is on this list the person will not be able to join the server. This way you can exclude players from joining. If there are multiple entries here the IDs have to be separated by using "|". Since 1.7.0 we have our own account system. You don't put Steam IDs into this field anymore, but Mars Account IDs, which you can find in the upper right corner of the main menu of the game. You can also look up the ID of other players in the Player List of the admin panel.
Admins	Array of Strings	"12345678910111213|13121110987654321"	No	A list of ~~Steam~~ IDs indicating which players have admin status on this server. Admins will be able to open a special UI and execute a selection of cheats from there. Since 1.7.0 we have our own account system. You don't put Steam IDs into this field anymore, but Mars Account IDs, which you can find in the upper right corner of the main menu of the game. You can also look up the ID of other players in the Player List of the admin panel.

~~PhotonSendDirect~~	~~Boolean~~	~~false~~	~~No~~	~~This flag changes the behaviour of the server to send data directly to the clients instead of routing the traffic through the Photon Master Server. If enabled, latency is expected to half at the cost of potential disconnects when connecting over the internet to the server. If disabled, all traffic is routed through the Photon Master Server, which increases latency, but can help with stability.~~ ~~When playing in LAN it is recommended to enable this flag.~~
Port	Number	7777	No	The port on which players connect. Make sure that this port is open in order for players to connect. Defaults to 7777.
~~SteamQueryPort~~	~~Number~~	~~27015~~	~~No~~	~~Port for Steam. Make sure it is open. Defaults to 27015.~~
BeaconPort	Number	15000	No	This port is used to query data from the server before fully connecting.

Overriding with Commandline Arguments

The following variables can be overwritten via commandline argument. In the case of `"MULTIHOME"` there is no applicable variable in the DedicatedServerConfig, so the variable can only be set via commandline argument.

If no commandline argument is set, the value from the config file is used.

Name	Type	Usage	Comments
Port	Number	-port=#### (i.e. -port=7778)	The port on which players connect. Make sure that this port is open in order for players to connect over the internet. Defaults to 7777.
~~SteamQueryPort~~	~~Number~~	~~-queryport=#### (i.e. -queryport=27016)~~	~~Port for Steam. Make sure it is open for the server to appear in the public server list. Defaults to 27015.~~
BeaconPort	Number	-beaconport=12345	The port used for beacons for initial connection. Make sure that this port is open in order for players to connect over the internet. Defaults to 15000.

MULTIHOME	String	-MULTIHOME="###.###.###.###" (i.e. -MULTIHOME=192.168.1.26)	Overrides the IP address the server is running on. The server will use one of the available IP addresses but will not ascertain that this is a publicly reachable IP address. Used in Multi-IP environments.
`MaxPlayers`	Number	-maxplayers=## (i.e. -maxplayers=12)	Maximal number of players for the server. Default is 64.

Custom RuleSet

In our ongoing effort to give players more control over how they play Memories of Mars, we added a second configuration file next to the DedicatedServerConfig. It's called `CustomRuleSet.cfg` and contains values that will change gameplay in different ways. If the file is not present, it should be created automatically as soon as your server starts and will be populated with the default values of your current server type (PVP/PVE). Of course you can create the file manually as well. Like the DedicatedServerConfig, the CustomRuleSet defines its values in the Json format and should look like this:

```
{
    "GameRules":
    {
        "ItemSpawnRate": 1,
  "EnableAISpawning": true,
        "AISpawnRate": 1,
        "AIHealthModifier": 1,
        "AIDamageModifier": 1,
  "EnableMeteorSpawning": true,
        "MeteorSpawnRate": 1,
    },
    "PlayerRules":
    {
        "LogoutWeightThreshold": 1,
        "OxygenDepletionRate": 1,
        "NutritionDepletionRate": 1,
"ShowPlayerNamesRange": 10000,
"OnlyShowAlliancePlayerNames": true
    },
    "BuildingRules":
    {
        "EnableBuildingDamage": true,
        "AdditionalBuildingBlocking": false,
        "DecayTimeInHours": 48,
        "ClaimOwnershipCostModifier": 2,
        "BuildingRanks": [
            {
                "RequiredFlops": 50,
                "MaxSupportedStructures": 25,
                "BoundarySphereRadius": 50,
                "ProtectionTimeInDays": 2
            },
            {
                "RequiredFlops": 100,
                "MaxSupportedStructures": 50,
                "BoundarySphereRadius": 75,
                "ProtectionTimeInDays": 4
            },
            {
                "RequiredFlops": 500,
                "MaxSupportedStructures": 100,
                "BoundarySphereRadius": 100,
                "ProtectionTimeInDays": 8
            },
            {
```

```json
        "RequiredFlops": 1000,
        "MaxSupportedStructures": 250,
        "BoundarySphereRadius": 150,
        "ProtectionTimeInDays": 12
    },
    {
        "RequiredFlops": 5000,
        "MaxSupportedStructures": 500,
        "BoundarySphereRadius": 200,
        "ProtectionTimeInDays": 16
    },
    {
        "RequiredFlops": 10000,
        "MaxSupportedStructures": 1000,
        "BoundarySphereRadius": 250,
        "ProtectionTimeInDays": 24
    }
```

```
            ]
        }
    }
}
```

Behavior

Depending on which kind of server you start (PVP/PVE) a different predefined RuleSet will be loaded. When starting the server this default RuleSet will be overridden with the values from your CustomRuleSet file. Unlike the DedicatedServerConfig, this file will update itself when shutting down the server, which means that changes made during runtime will persist. You can either change rules via Admin-Cheats or you can change the file directly during runtime. In the latter case, you need to reload the config with the cheat **ReloadCustomRuleSet**. You can also save your runtime changes manually with the cheat **SaveCustomRuleSet** but since the server saves them automatically on shutdown this is not required (could still be helpful if the server crashes). Cheats that change RuleSet values are prefixed with "**SetRule_**" and are continued with the name of the value you want to change.

Note that loading the file while having an invalid Json syntax, won't cause any changes to the currently used ruleset, leaving the previously set runtime values in place. Also keep in mind that changing the server type from PVP to PVE, or vice versa, will not change any values in your CustomRuleSet file. You might want to change some values depending on the server type you're using. If you make a switch and just want the default rules in place, just remove (or rename) the CustomRuleSet file.

Game Rules

Name	Type	Description
ItemSpawnRate	Number	Defines how fast loot will be considered for respawning. Will modify the default time of 30 minutes in a way that higher values will result in a shorter timespan. Ranges from **0.1** to **10** which translates to 5 hours to 3 minutes. Note that higher values can impact server performance.
EnableAISpawning	Boolean	Allows complete enabling and disabling of AI spawning
AISpawnRate	Number	Defines how fast AIs will be considered for respawning. Will modify the default time of 30 minutes in a way that higher values will result in a shorter timespan. Ranges from **0.1** to **10** which translates to 5 hours to 3 minutes. Note that higher values can impact server performance.
AIHealthModifier	Number	Allows tweaking of AI health (will be multiplied to the AIs default HP). Ranges from **0.1** to **10**.
AIDamageModifier	Number	Allows tweaking of AI damage dealt in any way (will be multiplied to the AIs default damage). Ranges from **0.1** to **10**.
EnableMeteorSpawning	Boolean	Allows complete enabling and disabling of Meteor spawning
MeteorSpawnRate	Number	Defines the interval at which Meteor Shower Events will take place. Higher means faster. Ranges from **0.1** to **10**

Player Rules

Name	Type	Description
LogoutWeightThreshold	Number	The percentage of your maximum weight capacity, at which items will be dropped when logging out. Ranges from **0** to **1**. Used to prevent players from logging out with all the stuff stored in their base. If set to 0 no Items will be dropped at all.

Name	Type	Description
OxygenDepletionRate	Number	Defines how much oxygen is consumed over time (will be multiplied to the default value). Ranges from **0** to **2**. A value of 0 will disable oxygen consumption entirely.
NutritionDepletionRate	Number	Defines how much food is consumed over time (will be multiplied to the default value). Ranges from **0** to **2**. A value of 0 will disable food consumption entirely.
ShowPlayerNamesRange	Number	The range (in cm) in which other players names are visible. Ranges from **0** to **10000 0** (1km). A value of 0 will disable player names entirely.
OnlyShowAlliancePlayerNames	Boolean	Defines if only player names of alliance member should be shown.

Building Rules

Name	Type	Description
EnableBuildingDamage	Boolean	Defines if buildings should be damagable.
AdditionalBuildingBlocking	Boolean	Currently Disabled - Can be ignored. (Will deny placing building parts at certain predefined locations when it's available)
DecayTimeInHours	Number	The time after which an unmaintained building gets removed from the server.
ClaimOwnershipCostModifier	Number	The upgrade cost of the current rank multiplied by this number is the cost for claiming ownership of an unmaintained building.
BuildingPreventionSphereRadius	Number	The size of the sphere around each building part that prevents other buildings from being built.
BuildingRanks	Array of Building Ranks	Defines building rank properties. **NOTE:** The number of building ranks can not be changed. If it doesn't have exactly 6 entries, changes will not be applied!
InitialGracePeriodInHours	Number	How long the building is protected from other people after placing the first foundation.

BuildingRank

Name	Type	Description
RequiredFlops	Number	The cost for upgrading to this rank.
MaxSupportedStructures	Number	The number of structures that can be supported at this rank.
BoundarySphereRadius	Number	The maximum building radius at this rank.
ProtectionTimeInDays	Number	The protection duration at this rank.
GracePeriodInHours	Number	The grace period duration at this rank.

Starting the Server

Restarts

The Memories of Mars server needs to be restarted twice daily, this is set up with the option `DailyRestartUTCHour`. Before the restart, the server will announce that it will restart in the in-game chat. After the server has been shut down, its process will end.

You are provided with two options for starting the game server:

- Without automatic restarting after the twice-daily shutdown
- With automatic restarting after the twice-daily shutdown

The server will shut down regardless of which option you choose. We currently don't support disabling this automatic shutdown system. If you don't need to run the server for 24h a day, you can set the `DailyRestartUTCHour` to a time outside of your regular playtime to not have the server shut down during play.

Windows

Either use the Steam UI to start the server, or navigate to the install folder of the game. In both cases, make sure to edit the config file for setting up the server beforehand.

Without automatic restarts

You can start the server and it will run until it shuts down by starting the game

- in the Steam UI with the default start option
- directly by starting the file `Game\Binaries\Win64\MemoriesOfMarsServer.exe`.

With automatic restarts
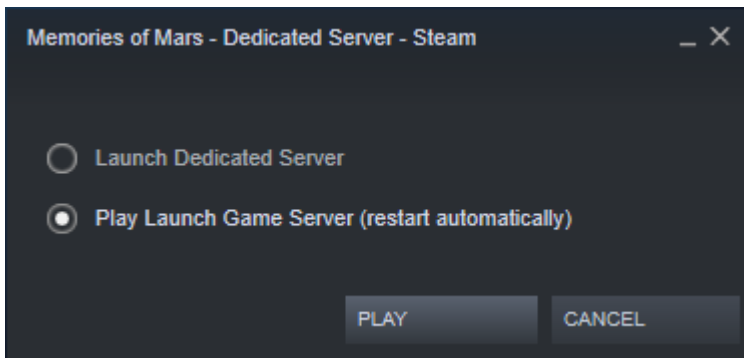
To run the server with automatic restarts:

- in the Steam UI choose the start option Launch Game Server (restart automatically)
- Run the batch script `Run Server.bat`.

Linux

Without automatic restarts

To start the server, start the script `MemoriesOfMarsServer.sh` in the installation folder of the game.

With automatic restarts

To start the server with automatic restarts, start the script `RunServer.sh` in the installation folder of the game. You might consider running this in the background or in a `screen` so it persists your login session.

LAN servers, Firewall issues

Port-Forwarding

A game server needs to ports to be open on UDP and TCP. Both ports are specified in the DedicatedServerConfig.cfg and can be changed to whatever ports you want (as long as they are different from each other). A public server needs to have both ports open. Depending on your setup of the host machine (the one running the server), you may need to open the ports in a firewall and in the internet router. Look up

your router model on this website on how to do that: https://portforward.com/

LAN server

With version 1.8.0 LAN servers will not work. We will work towards enabling them again.

Connecting to a private server

In-game browser

Choose either `ALL` or `PRIVATE` in the filter settings of the in-game server browser and connect to your server.

Steam server browser

You can join a server from the Steam server browser.

Database maintenance

The files for the database will be stored in the following folder: `Game/Saved/DB/{ServerID}/{SeasonID}`.

You can create an easy backup of your files by copying everthing inside this folder and paste it elsewhere.

Once the game reaches a new season the database folder will create a new database inside a new season folder. The data from the previous season is still stored, but will not be used for the new season. The reason for that is, that we can not guarantee that the way the data is stored will not change between seasons. So you will start with a clean database in a new season, just like on the public servers.

If you are still willing to try to save your old data somehow you can try to manually copy the data over from the previous season. This might or might not work, depending on the changes made. So expect your game to cause some problems afterwards. If you can't get the game to run anymore after this just delete all the files you put in there and make sure you have a clean database.

NOTE: There will be no support by us for manually moving old databases to your newer server in case of database-breaking changes between seasons.

Reporting Errors

In case you encounter an error with the server, please inform us about it by using the game's support page at https://fs30.formsite.com/505games/mars/index.html

Please attach any information that can help us track down the error. Especially server logs and crash dumps are interesting for us. This information can be found in:

Windows

The subfolder `Game\Saved` contains the data written by the servers. Especially the Game.log in the subfolder `Game\Saved\Logs` is good for us, as well as the contents of the latest crash report in a subfolder of `Game\Saved\Crashes`.

Linux

The subfolder `Game/Saved` contains the data written by the servers. Especially the Game.log in the subfolder `Game\Saved\Logs` is good for us. Additionally, the server creates a core dump, which you will find in the root folder of the game server as a file starting with `core`.

Admin Tools

Admins on a Dedicated Server are able to open an AdminTools window with F8. The key to show the window can be changed in the Input Settings (in case F8 doesn't work make sure it's bound there). From here you have the option to execute a selection of cheats to author your server.

Player List

The Player List shows all players that are currently connected to your server. At the bottom you have buttons to kick a selected player, teleport to them or teleport them to your current location.

Cheat List

The Cheat List contains a selection of cheats you are allowed to execute as admin. Here you can find the usual cheats like toggling GodMode, spawning AIs or refill your HP and survival stats. To execute a cheat select it from the list and click the Execute Button at the bottom.

There's also a cheat for changing the Server Password. Note that executing this cheat will not change the password in the DedicatedServerConfig and therefore will only be temporary. Also changing from no password to having a password or vice versa will not be reflected at runtime. You would need to restart your server and change the password in your DedicatedServerConfig to accomplish that.

Items

The Item List contains all items sorted by category. Here you cheat items into your inventory by selecting the item and clicking the Execute Button at the bottom. There's also a number field where you can enter the amount of items you want to receive.

To make it easier to find the items you desire, we added a search bar as well as the option to mark items as favourites which will then appear inside the Favourites category at the very top.

PDA Map

Admins also have the option to teleport themselves to an arbitrary location on the map. To do that, just open the map in your PDA, right-click on the location you want to teleport to and select the "CHEAT: Teleport here" option from the context menu.

Known Issues and Troubleshooting

My friends can't see my server in the server list

Please make sure you followed all instructions above, especially the one about port forwarding and firewalls. Make sure your firewall is open for the two ports in the DedicatedServerConfig for both UDP and TCP and that your router is forwarding them to you as well. 90% of all issues with the server come down to closed ports, so check it thoroughly. Also make sure to only run one instance per server on each installation and port configuration. If you run two servers simultaneously on the same configuration they might interfere with each other and none of them might work.

You can run multiple servers per computer, but have to do that via commandline overrides of ports. That is for advanced users only!

What about all those warnings/errors in the log! What am I doing wrong?

Nothing actually. Servers will throw a lot of warnings right now, but you can safely ignore them at this moment. They are not for you to fix, but us 😊.