CoSAIR Bot Programming Manual

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1 Introduction

This manual describes how to program bots for the CoSAIR[1] game engine. The exact game rules can be found in the CoSAIR Game Manual on the project website.

A bot has to make the following decisions in order to fully participate in the game:

- set the tax rate of the nation
- choose technologies to be researched
- recruit agents
- send agents on missions
- build items on planets
- rush the production on planets
- start colonisations of new planets
- relocate fleets to defend your planets
- attack enemy planets in order to conquer them

A CoSAIR bot has full access to all game information and actions, just like a human player has, and can make his decisions each turn.

If you are registered as a bot author for the project, you can create a new bot, download the skeleton source code, implement your game playing logic and upload it to the game server. Then you can test your bot in a test game against yourself and it may be chosen to participate in other CoSAIR games.

The Perl[2] programming language is used for writing bots. Apart from the basic variable and method handling and control structures, You should be familiar with arrays, hashes (associative arrays), references and object orientation.

[1] http://www.cosair.org/
[2] http://www.perl.org/

2 Architecture

2.1 Class Overview

A CoSAIR Bot is implemented as a Perl module. Each bot is derived from the `Cosair::AI::Bot` base class, and usually overwrites the high-level methods with his specific behaviour.

The core of a bot's behaviour is realised in the `Cosair::AI::Control` class. An instance of this class is always associated with your bot to connect it to the actual game. This class is used to gather all game information and to perform game actions.

Via the `Cosair::AI::Control` class, you will get in contact with the following additional AI classes of the game:

`Cosair::AI::Util` Class with misc utility functions

`Cosair::AI::Nation` Base class for any nation

`Cosair::AI::OwnNation` Class for the own nation

`Cosair::AI::NmeNation` Class for an enemy nation

`Cosair::AI::Planet` Base class for any planet

`Cosair::AI::OwnPlanet` Class for an own planet

`Cosair::AI::NmePlanet` Class for an enemy planet

`Cosair::AI::Agent` Class for an own agent

`Cosair::AI::Fleet` Class for an own fleet

Consult the corresponding API reference documentation on the project website for more details on any of these classes and their usage.

2.2 Support Technologies

Each error of a bot is stored in its *Error Log*, containing the game id, the nation name, the turn number and the error message.

Bots can log messages, which are stored in its *Message Log*. The messages are useful for debugging or

for controlling certain decisions, the game id, the nation name and the turn number are automatically prepended.

A bot has a persistent memory for each nation it plays. The memory is a dictionary with key/value pairs in which you can store simple scalar values. If you want to save list values for your elements, take a look at the set functions in `Cosair::AI::Util`.

2.3 Transaction Behaviour

Bots make their decisions in a sandbox. When all processing is finished, the game will try to apply the bot's actions. In case of an error, the error is logged and none of the actions is applied. Memory won't change either. However, messages of the bot are always logged.

3 Game Vocabulary

The following engine vocabulary is needed when using the AI framework.

3.1 Item Keywords

The following keywords represent the items you can build on planets in the game:

cruiser Cruiser of current type

freighter Freighter

transport Transport

colonyship Colonyship

medicenter Medicenter

barracks Barracks

factory Factory

starbase Starbase

biosphere Biosphere

mines 2 mines

3.2 Technology Keywords

The following keywords represent the technologies you can research in the game:

armouredcruiser Armoured Cruiser

assaultcruiser Assault Cruiser

fabrication Autofabrication

biomodelling Biomodelling

army Conscript Army

fusiondrive Fusion Drive

medicine Modern Medicine

starbase Orbital Engineering

security Security Network

mines Space Mines

3.3 Agent Action Keywords

The following keywords represent the actions an agent can perform on missions in the game:

intelligence_planet Gather Planet Information

intelligence_nation Gather Nation Information

sabotage Sabotage Production

unrest Incite Unrest

hijack_freighter Hijack Freighter