Simulating Autonomous Non-Player Characters in a Capture the Flag Scenario Using PALAIS

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Abstract.   PALAIS is a 3D simulation environment for artificial intelligence (AI) in games. It has built-in support for much of the standard functionality required when simulating AI behaviors. Most importantly, PALAIS allows users to define their own arbitrary game scenes with custom game rules. This paper presents the workflow of authoring game scenes in PALAIS by the example of a Capture the Flag scene. In particular, we demonstrate how users can take advantage of the provided scripting layer to rapidly define their simulation logic. This paper also serves as a description of the content of the accompanying demonstration given at the conference.

1   Simulation Environment

Game scenes in PALAIS are defined in packages called *scenarios*. These scenarios contain all code and graphical assets required for the simulation of the game scene. Users define the visual appearance of scenarios in an external 3D modelling tool. At runtime, users can access the functionality of PALAIS via a scripting or a native programming interface. The scripting interface can be accessed from the ECMAScript [2] programming language. Additionally, users can extend the functionality available to scripts by utilising the plugin system [3] incorporated in PALAIS. The combination of plugins and scripts allows for the definition of rich interaction patterns.

PALAIS automatically creates a blackboard [1] for each actor in a scenario. This form of knowledge representation provides a very flexible means of managing the data flow between the different components of a scenario. The contents of the blackboards of each actor can be examined during the simulation of a scenario. Figure 1 shows the knowledge inspector in action.

2   Capture the Flag Scenario

We chose a Capture the Flag Scenario as our exemplary game scenario. The Capture the Flag scenario involves two opposing teams. Each team has to capture the flag of the opposing team to score points. Characters can capture a flag by taking it from the initial spawning point of the opposing team to the initial spawning point of their own team. Implementing AI for non-player characters in a Capture the Flag scenario is a standard problem in game AI. Thus, it is well-suited to showcase the abilities of PALAIS. The arena of the implemented Capture the Flag scenario is shown in figure 2.

3   Authoring Workflow

To implement the Capture the Flag scenario we employ plugins that provide standard algorithms of game AI. These plugins allow us to delegate computationally intensive tasks, such as pathfinding, to native code. We use the scripting interface of PALAIS to orchestrate the actors of the scenario and to define the possible actions they can take.
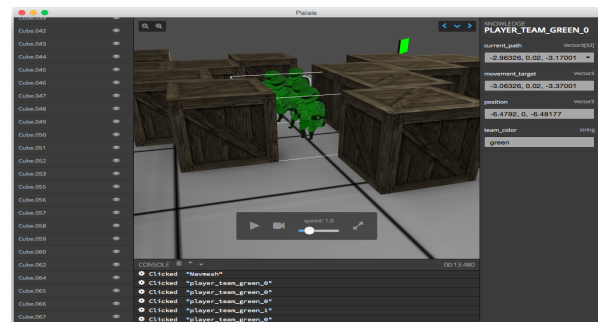

Figure 1.   A demonstration of the live inspection of blackboards available in PALAIS. The panel on the right shows the contents of the blackboard of the frontmost actor of the green team.
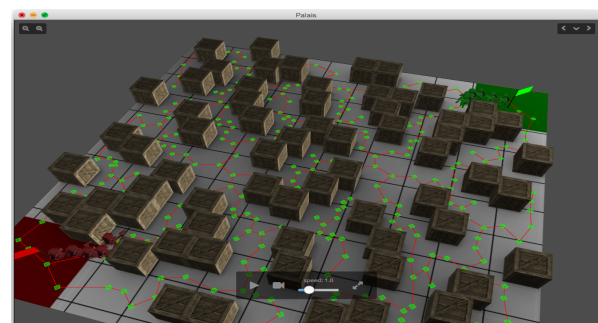

Figure 2.   A rendering in PALAIS that shows the arena of the Capture the Flag scenario.

REFERENCES

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