CSC
Convertible Scene Creator
Technical Document

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1 Introduction

- **Project's Context**
  As part of the game programming cursus at SAE Institute Geneva, for the **technical module GPR5100.2**, students of the second year must **assist students from the third year in completing their bachelor's project.**

  This year, the third year's **PokFamily team** develops a **video game for the Switch** and PC using a tailored **in-house engine**.
  Second year students must **assist them** by creating various **tools they will need** in order to create their game.

  This document describes the functioning of the **Convertible Scene Creator** tool, **CSC** for short.

- **Project's Goals**
  - Create a useful tool that the PokFamily team will use to create their video game.
  - Learn to work in a non-academic environment in a team that depends on the student's performance.

- **Specific Problem**
  The PokFamily team uses the **Unity engine as an external editor**. The PokFamily team needs a tool to **export Unity scenes and prefabs** that may then be used inside the PokEngine.

2 Requirements

This project's requirements have two origins:

- **Academic requirements**
  - The task given by the team has been understood and done in time.
  - The tool is maintained by the student after the tool's completion.
  - The tool must be user-friendly.
  - The student understands how to manage data.
  - The student understands how a game engine interfaces with a game engine editor.
  - The student has organized himself and his work in a way to facilitate the work of others.
  - The tool's performance is reasonable.
  - The implementation is appropriately sophisticated.
  - The student understands the implications of non-academic teamwork.
- **Pragmatic requirements**
  - Convert Unity scene and prefab files to files readable by the PokEngine's parser via UPDC.
  - The user must be able to interact with the tool via Unity.
  - The code must satisfy the quality and style expected by the team. C++ coding style is defined in the Coding Style Document. C# coding style is defined in UnityWorkOrganization document.
  - The student must communicate with the team appropriately and be dependable.

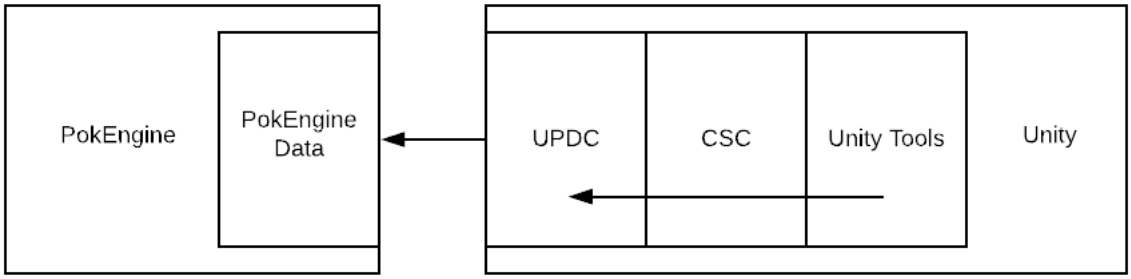
3 Technologies Used

- **PokEngine**
  The **PokEngine** is the game engine developed by the PokFamily team. The engine is **written with C++ standard 2014** and **partly C++ standard 2014** for code running on the Nintendo Switch.
  The engine has a parser that is capable of reading JSON files. This parser is used to import data exported from Unity with UPDC.
- **Unity 2019.1.10f**
  Unity 2019.1.10f is used as an **external editor**.
- **Visual Studio 2017**
  Visual Studio 2017 is used for development of the PokEngine.
- **Git**
  github.com is used for versioning for the **PokEngine source code**. **gitlab.com** is used for versioning for the **Unity prototype source code**. Git bash is used for most interactions with the git framework. Merge conflicts are solved manually via text editor and git bash.

4 UML Diagram

TODO

5 Interaction with Overall Project



CSC integrates with UPDC to export scenes and prefabs. As such, it interacts with Unity's database from which it creates .asset files for UPDC to export.

6 Tackling Genericity

In an **earlier version** of the tool, it **was capable of successfully exporting scenes** with their game objects, colliders, models and prefabs. **However, the implementation exportation of any additional components** located on game objects **would have required the user to dive deep into the code** of the CSC.

This is why the **tool was redesigned to allow easier implementation of exportation of new convertible components**. This was done by **splitting the ConvertibleSceneCreator between two .cs files** (ConvertibleSceneCreator.cs and Components.cs) using the "partial" keyword of the C# language.

In doing so, **only the relevant part of CSC code is exposed to the user and the exportation implementation** for new convertible components **can be done by adding a few lines of code only** inside the ConvertibleSceneCreator class **at locations very explicitly commented**. The **user no longer needs to understand the functioning of CSC** in depth **to expand the tool**'s functionalities.

The decoupling of the tool in this manner did not require the need for runtime reflection, which can be tricky to implement. All that was needed were a few abstract classes and the use of some C# generics.

7 Tackling Polymorphism

TODO: WIP second parser to remove empty fields TODO: update UPDC doc when done

8 Exporting Prefabs

TODO: prefab =¿ fbx

9 Exporting FBX and OBJ Files

TODO WIP

10 Integrating with ProBuilder

TODO: WIP probuilder =¿ prefab =¿ fbx

11 Potential Improvements

- The prefab exportation had been done in a rush, the current implementation has a lot of room for improvement:
  - WIP: There are way too many data structures defined to separate between different types of prefab objects, there must be a more elegant way to represent them.
- While exportation of ProBuilder meshes is functional, it is implemented in a way as to duplicate already existing meshes. This is a behaviour that could be improved.
- WIP: As a consequence of UPDC's implementation, polymorphism is not handled. A redesign of UPDC might make the implementation of collider exportation more elegant.

12 Summary

TODO