Better Tower Defense – Design Document

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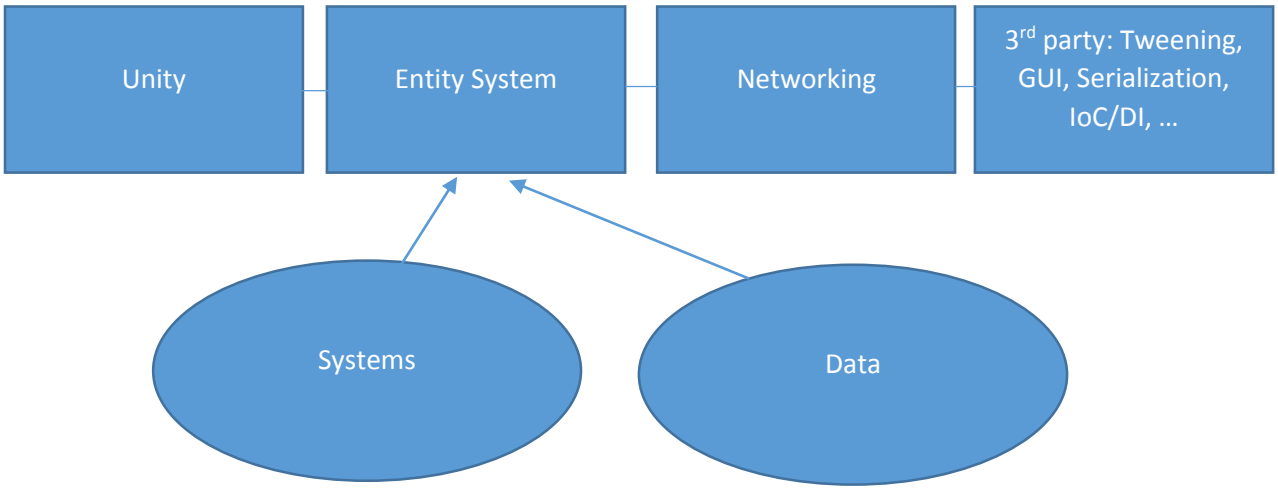
System Architecture – 5000 miles

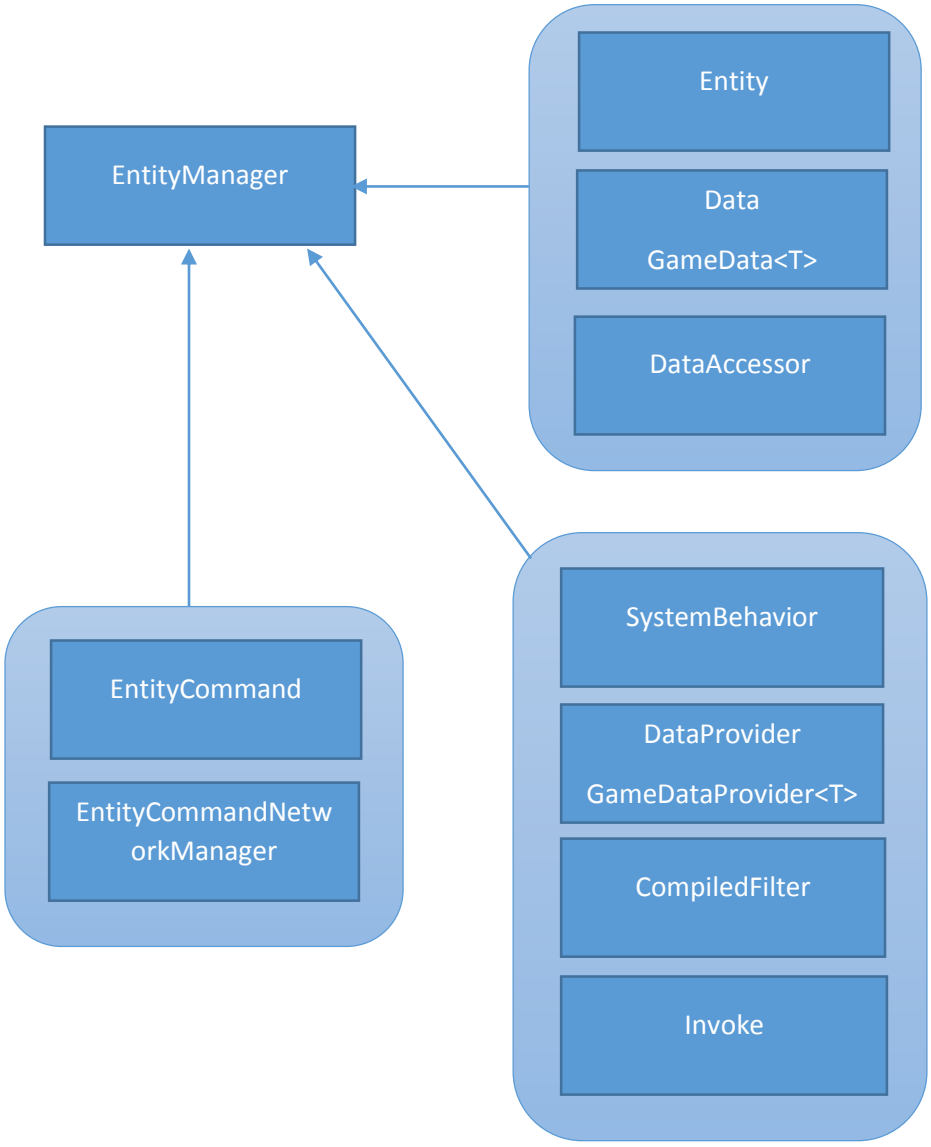
Unity is the Unity engine; the Entity system is described below; Networking relates to interfacing with other computes; the 3rd party code involves many systems, such as tweening, GUI work, serialization (protobuf), potentially inversion-of-control/dependency injection…. Systems and Data are all of the gameplay logic.

Hopefully it is obvious, but this is an extremely simplified model of the engine; the actual models would be much too long – the Entity system model below does not even go into full detail, yet it has surprisingly complexity even in the simplified form.



System Architecture Overview - Entities

An overview of the entity system, with relevant modules grouped together. The EntityManager coordinates all of the work; the Entity contains Data; the DataAccessor is used for quick retrieval of Data; the EntityCommand is structured user input, whereas the EntityCommandNetworkManager issues EntityCommands to the EntityManager; the SystemBehavior is user-defined logic that operates on Entities, which is selects by using a combination of an Invoke and a set of Filters (which are processed to form a CompiledFilter); DataProviders mediates between the Unity entity system and this one. GameData<T> and GameDataProvider<T> provide type erasure for Data and DataProvider so that they can be used generically through the EntitySystem but client code has type safety.



Feature Implementation Notes

Entity System

See the architecture overview for the Entity System.

Networking

Connect to a server with the given password

Connect(string ip, string password)

Disconnect from a server or shut the server down

Disconnect()

Start running a server with the given password

StartServer(string password)

Send a network command, ie, pause the game.

SendCommand(NetworkCommand command)

Listen to a network message, ie, when we receive a pause game message.

AddCommandListener(Type commandType, Action<NetworkCommand> listener)

Unit Spawning

Uses the entity system; listen for objects which have “SpawnWave” data and spawn based on that data. No API.

Locomotion

Uses the entity system; listen for objects which have “PathingData” and move based on that (ie, it will contain a target, a path to follow, …). No API.

Effects

Uses the entity system; listen for objects which have “Effects” attached to them and change the object status based on said effects. No API.

Building Placement

Attempt to build a new building at the given location; return if successful. Called via the network messaging system; UI creates network messages and sends them.

bool BuildAt(vec3 location, GameObject prefab)

Resources

Uses the entity system; listen for buildings which can modify resource state and update based on them. No API.

Power System

Use the effect system; tie into spatial optimization systems; no API.

Dynamic Difficulty

Use the entity system; modify spawning data (so it ties into the spawning system). Uses a separate statistics module which just monitors the game gathering relevant statistics (number of enemies killed, number of players, average enemy life span, …). No API.