[RFE WEATHER PLUGIN DEVELOPMENT]

Installation guide, user manual and developer guide for RFE Weather plug-in (build 0.122)

About RFE Plug-in series

RFE Plug-in Series is a set of plug-ins created to enhance the realism and game play of ISI's **rFactor** 1, developed and licensed by **Symracing.net**. We all know what rFactor is, and most of the times such a complex engine (simple enough to run on a home laptop) has been be tweaked to create the most amazing and realistic games. However, not all the possibilities have been explored yet. There is a lot of work to do, and the only way we can do (as long as the game code has not been publicly released, will it ever be?) is using plug-ins that provide the missing functionalities we all love to see in a game.

RFE WEATHER PLUGIN

Symracing is releasing this special package "RFE WEATHER Plug-in", intended to allow interaction between the RFE WEATHER component and other rfactor applications. Please read carefully this documentation if you want to use RFE Weather information in your plug-in.

Installing RFE Weather Plug-in

"Microsoft Common Runtime Library" package is no longer required when installing RFE Plug-in Series version 1.2 or above. The plug-in is known to work on Windows XP, Vista, 7, 8 and Windows Server 2012 (both 32 and 64 bits versions).

Note: The build version shown in these images may be different from the one provided.

> **Important note**: Although RFE components can work separately, it is recommended to install the whole RFE Plug-in Series package to enjoy the most of the available features. Sometimes a functionality of a single component is triggered by other elements of the package.

Additional documentation or support/help on how to use this tool for specific purpose may be found at RFE Plug-in Series forum site: http://symracing.net/rfeseries/forum

RFE Weather Plug-in configuration

The plug-in is preinstalled with a default configuration file that enables all the features. Additional changes to this default configuration should be included in the configuration file located at:

[Rfactor Folder]/Plugins/RFE/Config/RFEWeather.ini

RFE Weather Real Time weather

RFE Weather Plug-in comes with the real-time weather feature enabled from build 0.119. This interface allows external applications to change the ambient/weather conditions on a hosted game:

- Change ambient and track temperatures.
- Change ambient conditions.
- Change track wetness.

Important note: RFE Weather plug-in allows Real Time weather changes only on hosted sessions that mean that clients connected to a network game can't make straight use of this feature as they must obey the server's weather conditions.

To make use of this 'real-time' feature, an external application can create a special purpose file located at: *[Rfactor Folder]/Plugins/RFE/Scripts/Weather/RealTime.ini*

The presence of this file is checked two times per second. If the file exists, the contents are translated as new weather information and **after that, the file is deleted**. The contents of this file are explained in more detail in the options section.

Applications creating this special file must only include the options that must change. If you want to keep current ambient temperature as it is in-game, then do not include this parameter in the .ini file.

Make sure all parameters in the realtime.ini file are included in the '[GENERAL]' section.

Important note: It does not matter the weather mode used to create the session. An external application can make the RFE Weather plug-in operate in 'Real time' mode by using a special attribute in the realtime.ini file.

PLUGIN SERIES

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RFE Weather Real-time options

The following options can be included in the special realtime.ini file to control the game ambient/weather conditions:

RealTimeWeather : Enables or disable the real time weather feature.

Use 1 or 0 to enable or disable this feature as in the following example.

```
[GENERAL]
RealTimeWeather= 1
```

When the external tool stops serving real time weather remember to put this attribute to 0 again, to disable this feature, or the plug-in will expect external control for the ambient information and wait for updates.

From now on, any of these parameters must be considered as in the 'scripted' mode.

OnPathWetness : Control the amount of wetness on the racing line of the track.
OffPathWetness : Control the amount of wetness on the rest of the track.

OnPath and OffPath wetness control the amount of wetness on the track. They can be any value from 0.000 to 100.0.

The following example will dry the racing line (leaving the rest of the track wetness untouched.

```
[GENERAL]
OnPathWetness= 0.0
```

AmbientTemp : Control the ambient temperature
TrackTemp: Control the temperature of the track.

These two parameters control the temperatures of the session. Temperatures can be ranged from 0.0 to 100.0.

The following example sets the track's temperature to a custom value.

```
[GENERAL]
TrackTemp = 33.1
```

Conditions : Control the humidity ambient conditions.

The Conditions represent the ambient humidity and thus creates the different rain or overcast conditions. The value must be within 0.000 to 100.0.

From 0.00 to 33.0 represent the best conditions at all. No clouds, clear sky, sunny day.
From 0.33 to 65.0 represent chances of get some clouds in the sky.

From 0.65 to 0.71 represent chances of storm conditions.

From 0.71 to 1.00 represent rainy conditions. The bigger the value the more rain will appear.

The following example will set light rain conditions on the session.

```
[GENERAL]
Conditions=77.0
```

Real Time mode tips

The RFE Weather plug-in will check the presence of the realtime.ini file twice per second. That does not mean the file must be updated so many times. Write the file only when you want to change any (one or many) of the current weather conditions.

If the realtime.ini file does not exist, the plug-in will keep working and using the current values it has in memory. If the Randomizer is enabled, the weather information might change slightly from those written in the realtime.ini file.

Once the file is read and interpreted by the plug-in, it is deleted automatically. Do not expect to find the file and use it because the plug-in destroys it to avoid re-reading its contents.

If you need to know the current in-game weather status before writing the realtime.ini (to make sure you apply smooth changes to the ambient parameters) then you might need to use the weather broadcast network feature.

If you write a tool to control the weather in real time mode, remember to disable the real time mode of the plug-in when exiting the application usage, by creating the realtime.ini file and the including "RealTimeWeather=0". This will make rfactor to continue in regular mode.

Note: reverting back from real time weather mode to regular weather mode may leave rfactor internal's ambient structure incomplete. This also happens when the application controlling the real time weather mode stops without informing the plug-in about it. In these cases it is recommended to restart rfactor or rfactor dedicated again.

RFE Weather broadcast output

RFE Weather Plug-in comes with the ability to send through the network some data about the current session including the current ambient weather information.

RFE Weather Plug-in configuration

In order to make use of the RFE Weather plug-in information you will have to enable broadcast options in the RFEWeather configuration file located at:

[Rfactor Folder]/Plugins/RFE/Config/RFEWeather.ini

Read carefully the available options and focus on those related to 'broadcast information' under the 'GENERAL' section of the settings file.

```
# Broadcast weather information to this address and port, used by other plugins
# to get weather forecast information for the session. Read the development
# documentation to understand what is being send through this socket and how to
# interpret this information.
# Setting BroadcastPort to 0 will disable this option.
BroadcastAddress = 127.0.0.1
BroadcastPort    = 1975
```

Enabling this option will make the plug-in to inform twice per second about the current session status and weather information. To make use of this information you will have to create your custom network handler waiting to receive information on this channel first.

> **Important note**: RFE Weather plug-in submits information ONLY once when the session is started (if there are no any players) and twice per second when there is at least a driver on the track and the session is running.

RFE Weather Network Packet Structure

Currently the plug-in submits a very specific structure for the session information packet; however it includes enough information to understand the current session status. It is important that before processing the packet you first check packet signature and version, because they will define the internal structure used in the submitted packet.

Currently only version 0x00000000 is being supported by the plug-in. This is the C structure of the network packet version 00.

```c
struct RFEWeatherBroadcast {
    char   RFESignature[8];   // Should match "RFEWeath"
    DWORD  Version;           // For now only version 0x00000000 is supported
    char   mTrackName[64];    // current track name
    long   mSession;          // current session
    float  mCurrentET;        // current time
    float  mEndET;            // ending time
    long   mMaxLaps;          // maximum laps
    float  mLapDist;          // distance around track
    long   mNumVehicles;      // current number of vehicles
    unsigned char mGamePhase; // 0 Before session has begun, 1 Reconnaissance laps, 2 Grid walk-through...
    signed char mYellowFlagState; // Yellow flag states (applies to full-course only)
    signed char mSectorFlag[3];   // any local yellows at the moment in each sector
    unsigned char mStartLight;    // start light frame (number depends on track)
    unsigned char mNumRedLights;  // number of red lights in start sequence
    bool mInRealtime;         // in realtime as opposed to at the monitor
    float mDarkCloud;         // cloud darkness: 0.0-100.0
    float mRaining;           // raining severity 0.0-100.0
    float mAmbientTemp;       // temperature (Celsius)
    float mTrackTemp;         // temperature (Celsius)
    TelemVect3 mWind;         // wind speed (in x, y, z)
    float mOnPathWetness;     // on main path 0.0-100.0
    float mOffPathWetness;    // on main path 0.0-100.0
};
```

Suggested Packet Parsing Process

First, make sure that packet signature matches the "RFEWeath" signature and ignore any other packet to avoid unwanted packets arriving to the same network port of the broadcast channel being parsed.

Make sure packet version is 0x00000000 before continuing. Future versions might change the overall packet structure. The presented structure is for version 00, and must be ignored for other versions.

The mDarkCloud and and mRaining represents the percentage of clouds and rain presents in the session, and thus its values range from 0% to 100%. The OnPathWetness and OffPathWetness values also represent percentage of track wetness from 0% to 100%.

Due to memory copying operations, the track name might include some garbage, however the string can safely read using any string-z function because it is terminated using the 0x00 character.

Appendix

LICENCE

The Software refers to the RFE Plug-in Series. The Authors refers to the group of creators of the Software, represented by Iñaki López.

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