swift
- the Open Source Pilot Client -

W14 Conference

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Speakers today

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This presentation will be...

… about what will be different with this client.

… about why **swift** is a innovation.

This presentation will be...

… about our concepts, ideas and possibilities …

... the current status, where we are...

… about the future …

... how you can help us.

This presentation will NOT be...

… yet another pilot client user demonstration.

… a tutorial for specific parts of the user interface.

Time frame and questions

- Talk about 45mins

- Q&A about 15mins

- Fell free to ask your questions

    – We either answer them immediately,

    – or in the Q&A

    – wherever it fits best

Design goals

- Distributed system:
  GUI, audio and core can be distributed

- Platform independent system

  – OS independent, primary platforms
     Window, Linux, and Mac OS

  – Flight simulator independent, main focus on
     FSX, P3D, and X-Plane

- Traffic network tool ecosystem

  – API for 3rd parties (via DBus)

  – Plugins

  – Vision: Stop the tool diffusion and drag small extensions into
     the pilot client

Design goals

- Improved model matching via database

- Improved algorithm for aircraft interpolation (how the aircrafts move between position updates)

- Support of all protocol features such as `model string` or `interim position` (fast position updates)

- Near real time position updates (formerly known as P2P)

- However, not all goals will be met in the first version, but he architecture is designed for gradual improvements

Drawbacks – or
"there ain't no such thing as a free lunch"

- Unfortunately, all the nice ideas such as

  – distributed system,

  – platform independent code, and

  – plugins,

- consumes a lot of time for

  – designing the architecture,

  – writing, and

  – testing the code.

All code is Open Source...

Yes, all source code except for one small library of VATSIM proprietary code.

```
#include "simulatorinfo.h"
#include "blackmisc/blackmiscfreefunctions.h"

using namespace BlackMisc;

namespace BlackSim
{
    CSimulatorInfo::CSimulatorInfo(const QString &shortname, const QString &fullname) : m_fullname(fullname), m_shortname(shortname)
    { }

    CSimulatorInfo::CSimulatorInfo() : m_fullname("Unknown"), m_shortname("Unknown")
    {}

    uint CSimulatorInfo::getValueHash() const
    {
        return qHash(TupleConverter<CSimulatorInfo>::toTuple(*this));
    }

    QVariant CSimulatorInfo::getSimulatorSetupValue(int index) const
    {
        return this->m_simsetup.value(index);
    }

    QString CSimulatorInfo::getSimulatorSetupValueAsString(int index) const
    {
        QVariant qv = getSimulatorSetupValue(index);
        Q_ASSERT(qv.canConvert<QString>());
        return qv.toString();
    }

    void CSimulatorInfo::setSimulatorSetup(const BlackMisc::CIndexVariantMap &setup)
    {
        this->m_simsetup = setup;
    }

    QString CSimulatorInfo::convertToQString(bool i18n) const
    {
        Q_UNUSED(i18n);
        return QString(this->m_shortname).append(" (").append(this->m_fullname).append(")");
    }

    int CSimulatorInfo::getMetaTypeId() const
    {
        return qMetaTypeId<CSimulatorInfo>();
    }

    bool CSimulatorInfo::operator ==(const CSimulatorInfo &other) const
    {
        if (this == &other) return true;
        return TupleConverter<CSimulatorInfo>::toTuple(*this) == TupleConverter<CSimulatorInfo>::toTuple(other);
    }

    bool CSimulatorInfo::operator !=(const CSimulatorInfo &other) const
```
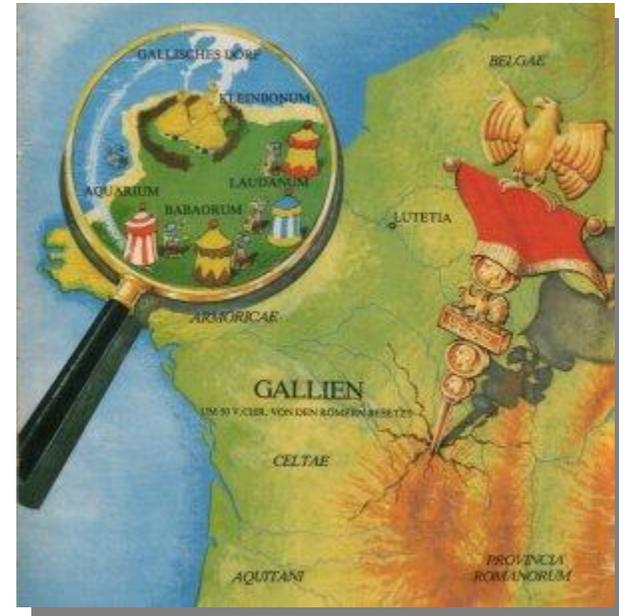
All code??

The NDA challenge

- VATSIM network/voice code is protected

  - Can only be viewed by programmers who sign NDA

  - Can not be made public

- Pilot client requires a minimal amount of closed source code for the actual protocol

  => `vatlib` (aka `shimlib`) by Gary Tekulsky

Why Open Source?

Can you remember the hundreds of crash reports
in Flight Simulator forums?

Why will all these
issues never be fixed?

Because the source code is not available!

Why Open Source?

Learn from the past …

- Many VATSIM related projects have not been successful or have been discontinued

- Almost always the same reason: Original contributor is unable/unwilling to further maintain the project (… understandable)

- We try to avoid this straight from the beginning: No dependency on a single person

Why Open Source?

You want a new feature, but developers are busy?

Get the source code and
do it yourself!

Why Open Source?

We want to:

… attract other people/companies to use our code.

… report back improvements and new features.

… enable a continuous development process.

An Open Source license will ensure that the code will be available, free of charge, and open!

Cross Platform

The client is written as a cross platform application
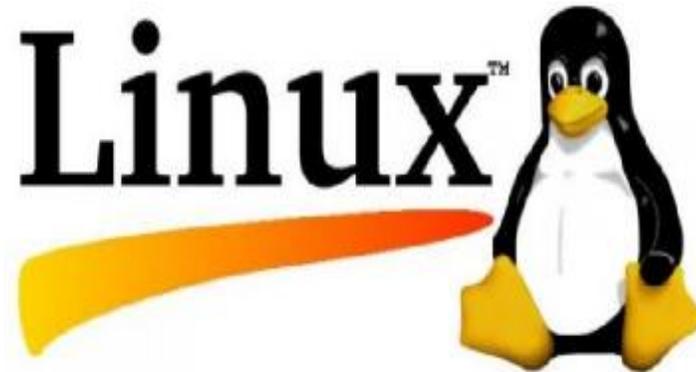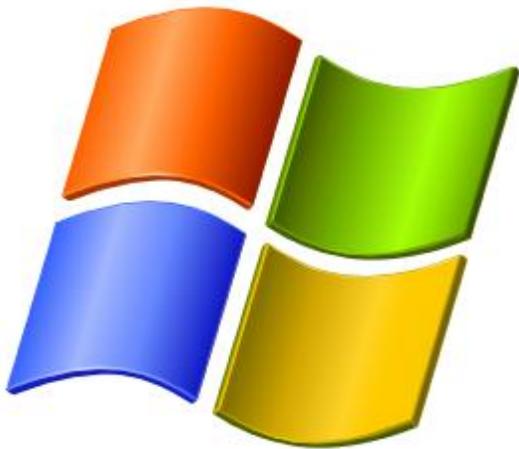
using the Open Source Framework Qt5

Why Qt/C++?

- We need a platform independent tool chain

- We need a freely available IDE so that anybody can join

- C++ allows tight integration with all simulators

- C++ allows small footprint integration with all simulators, even with legacy technologies

- Remark: This technology stack is not the only one possible, but a reasonable choice

Can you spot the difference?

It runs on Windows

It runs on Mac OS X

It runs on Linux

TODO

Cross Platform

Summary

- Same look and feel on all platforms

- Native support

- Runs on any OS

  – supported by Qt

  – and DBus

Support for Multiple Simulators
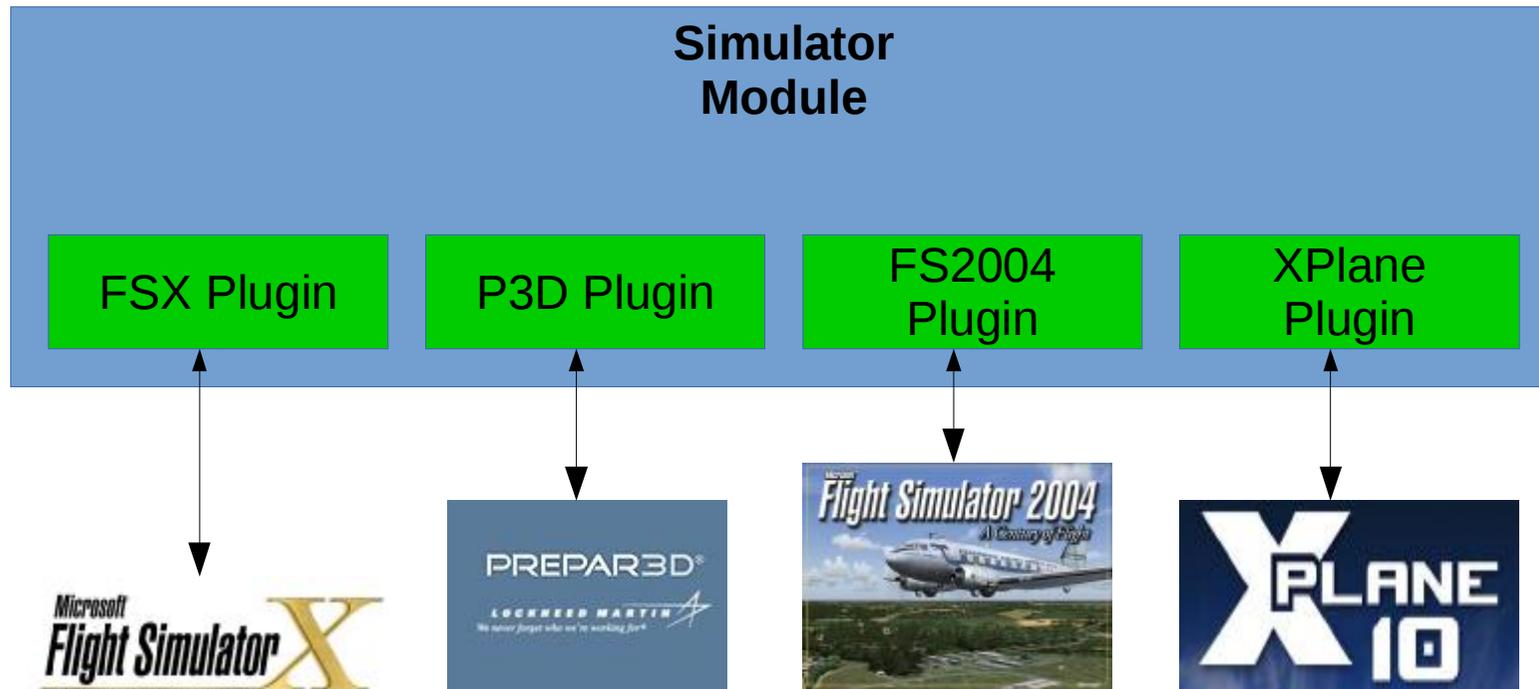
Your favorite Simulator is missing?
Take the initiative and submit a plugin for it.
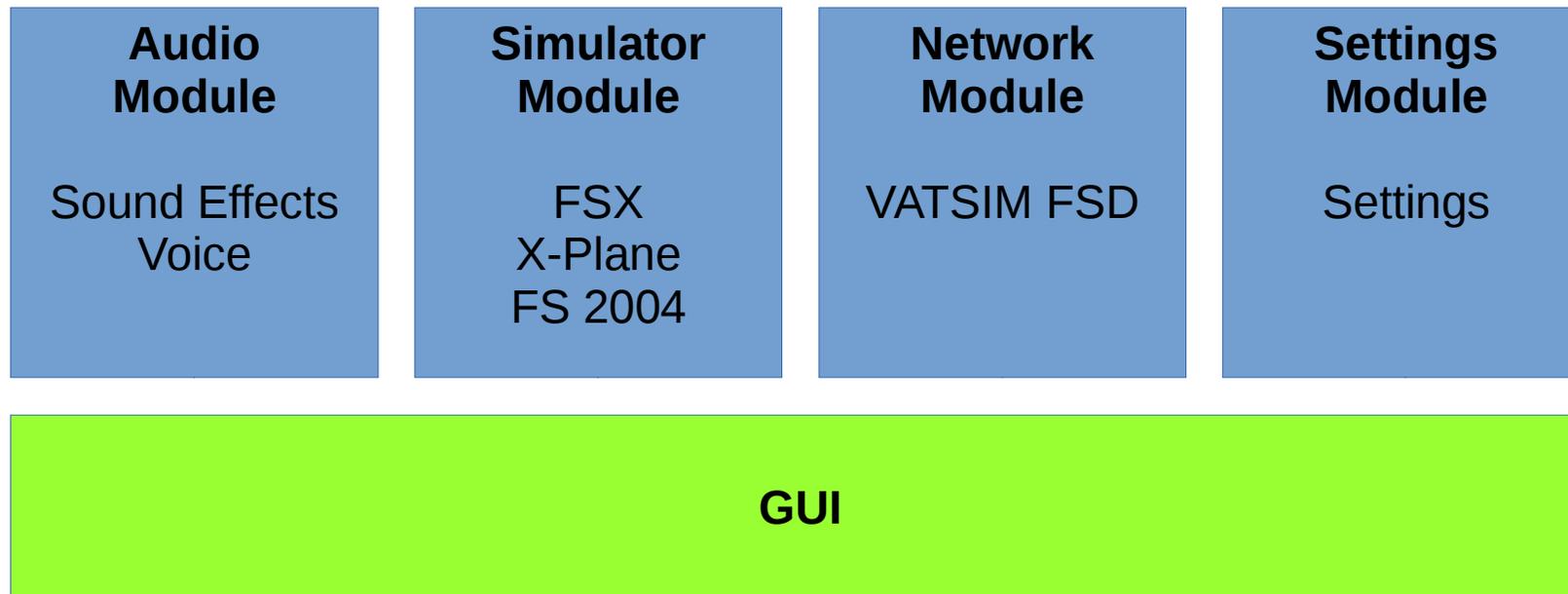
Status of simulator plugins
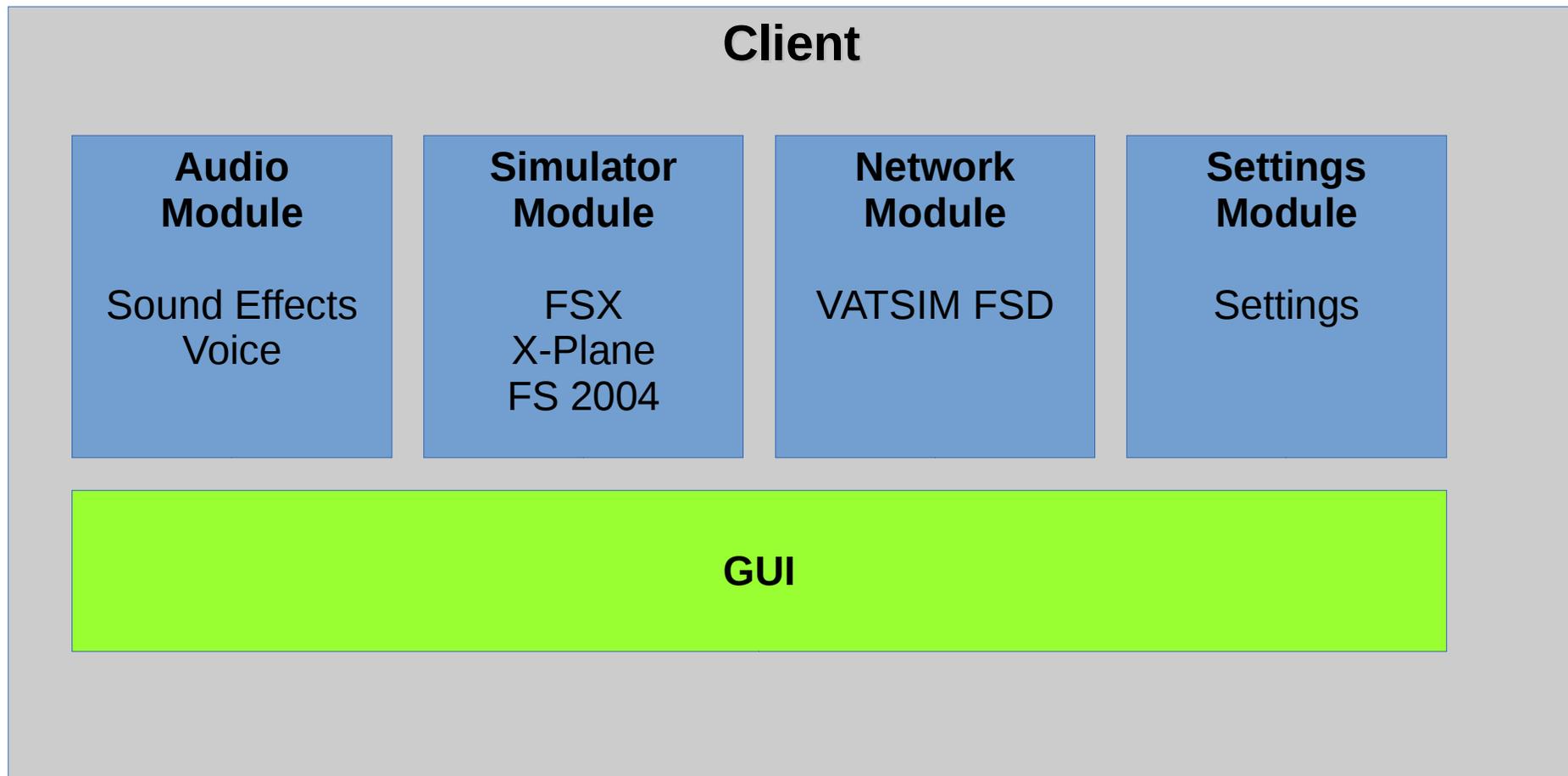
In Progress

FSX

P3D

X-Plane

Planned

FS 2004

Distributed client - Introduction
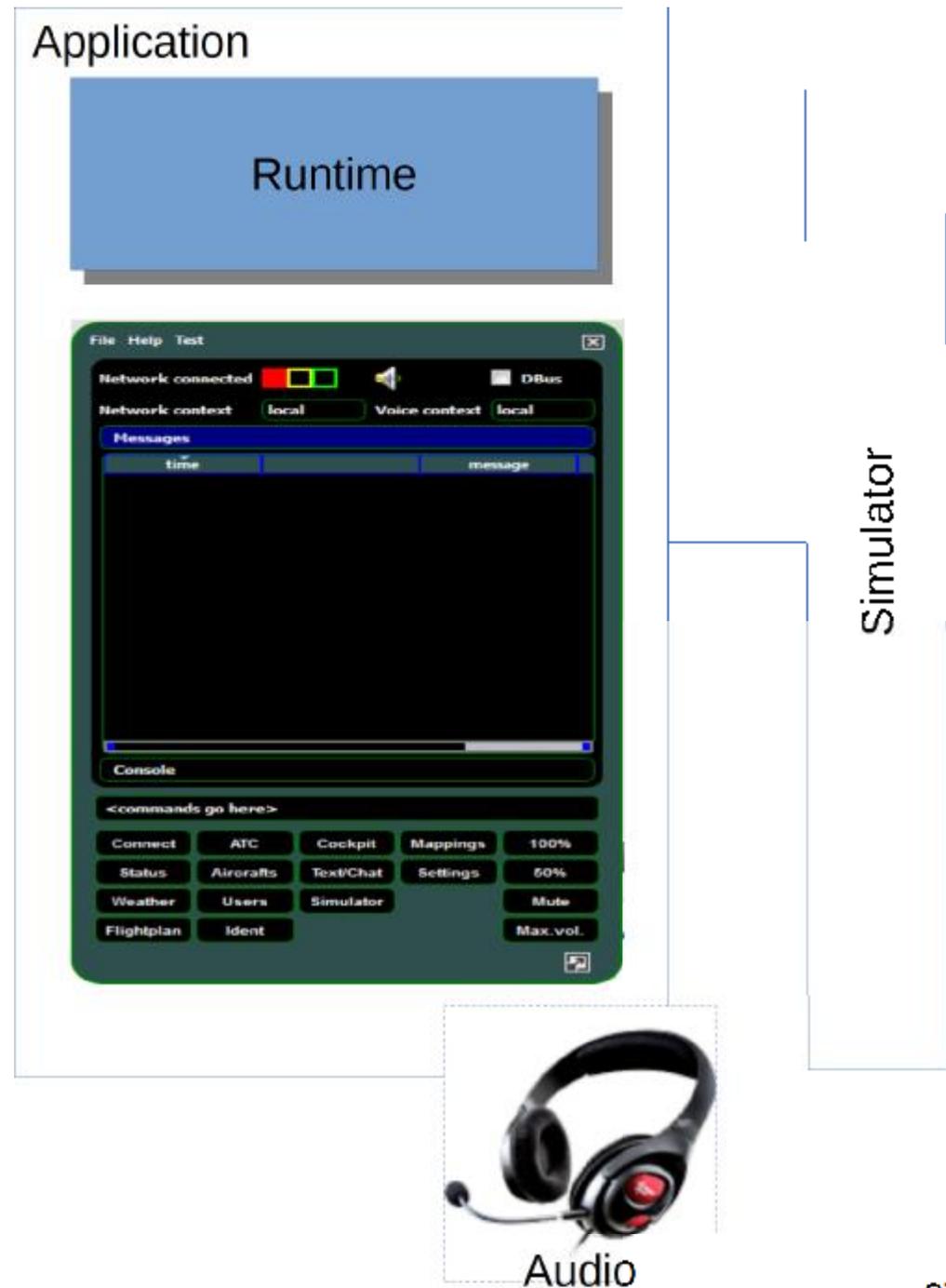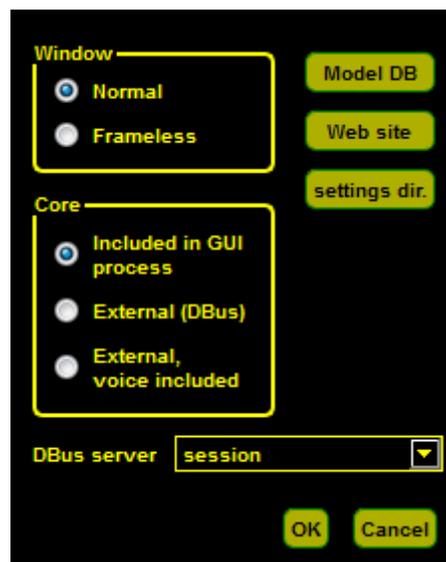
Client consists of several modules:

Audio Module	Simulator Module	Network Module	Settings Module
Sound Effects Voice	FSX X-Plane FS 2004	VATSIM FSD	Settings

GUI

Distributed client – All in one

Client

Audio Module	Simulator Module	Network Module	Settings Module
Sound Effects Voice	FSX X-Plane FS 2004	VATSIM FSD	Settings

GUI

Deployment 1: Single

- Single executable

- Pilot client with all its logic run in one process

- Audio on the same machine

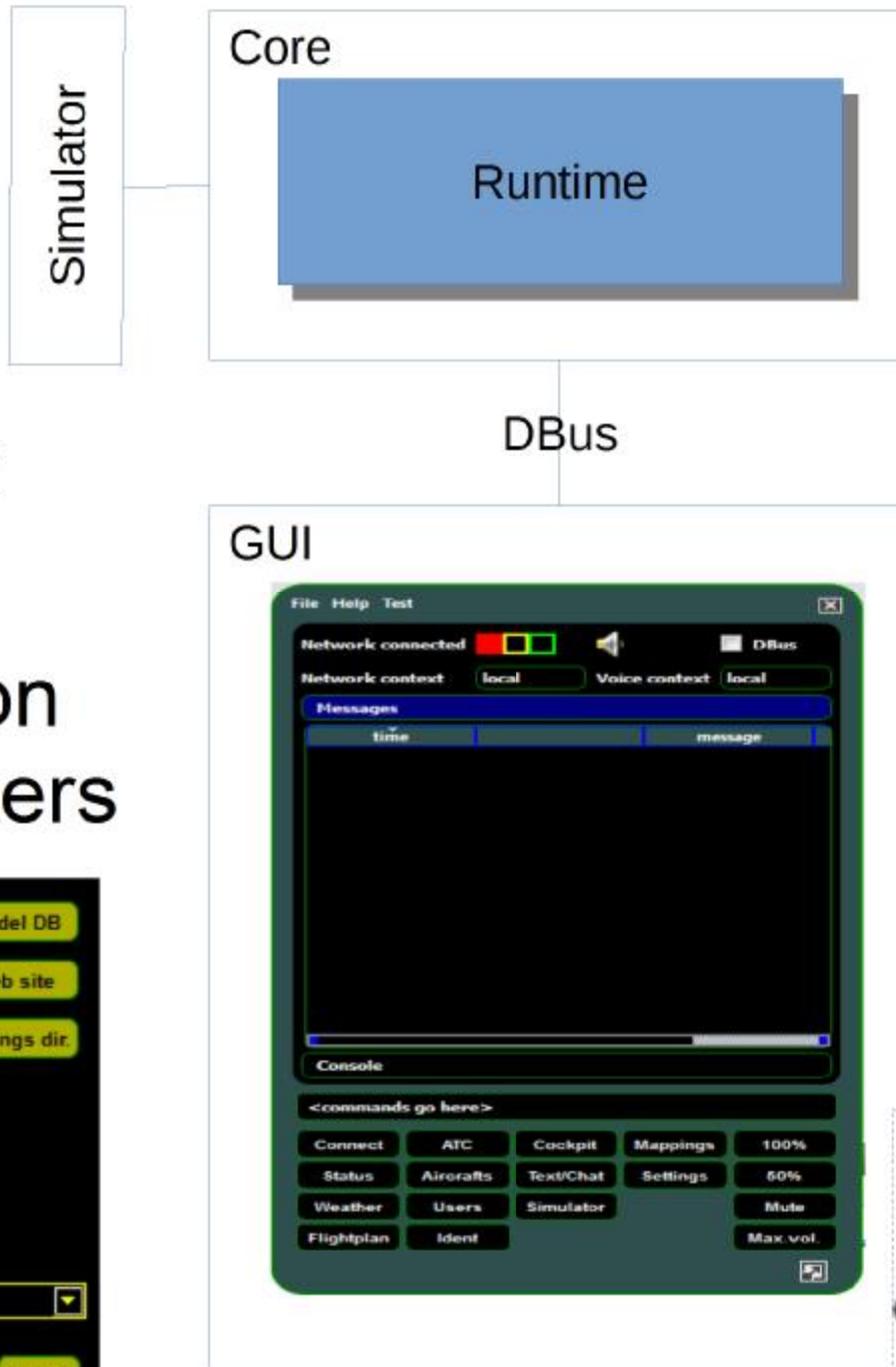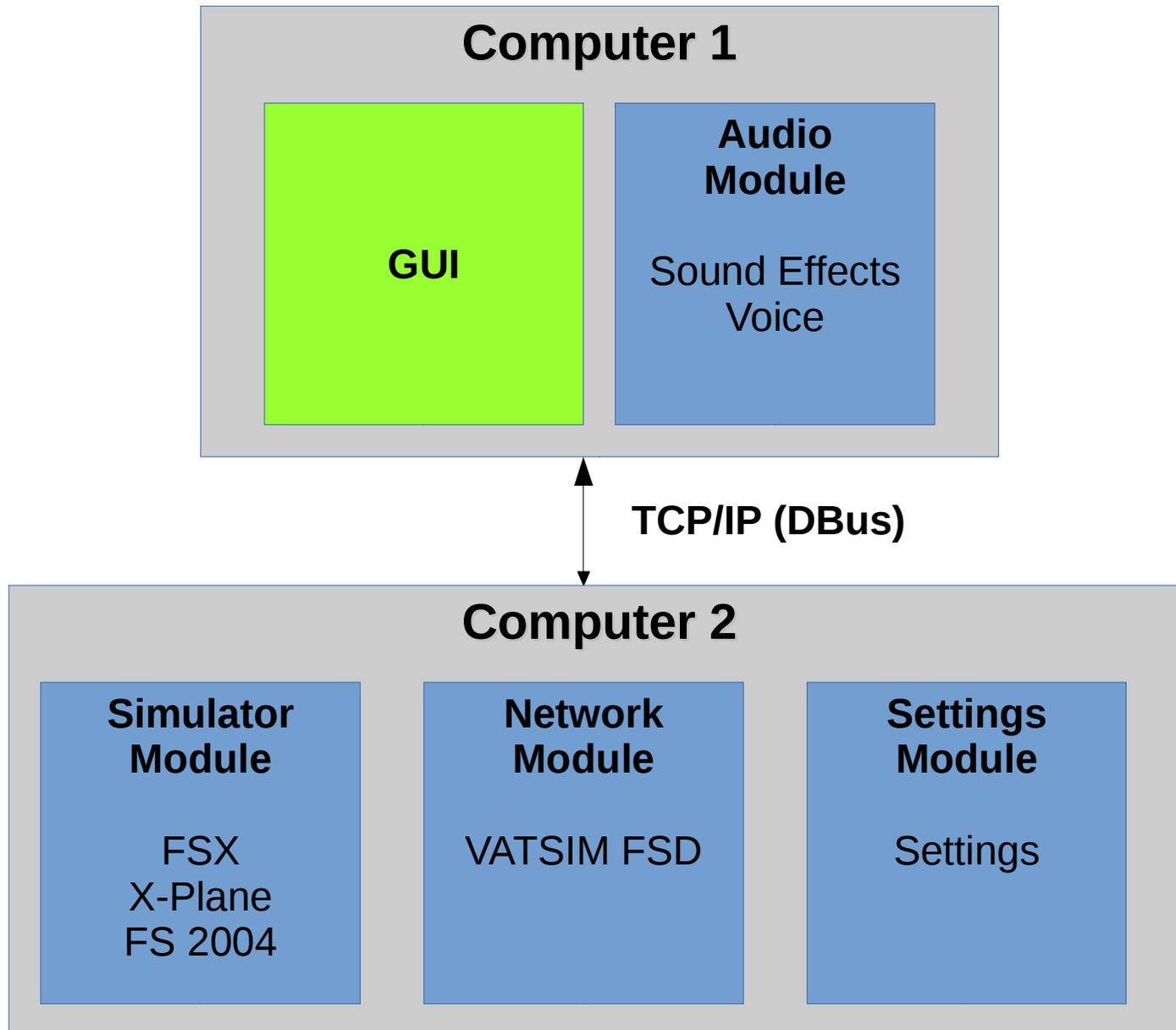# Distributed client – Two processes

Client Application

Audio Module	Simulator Module	Network Module	Settings Module
Sound Effects Voice	FSX X-Plane FS 2004	VATSIM FSD	Settings

DBus

GUI Application

GUI
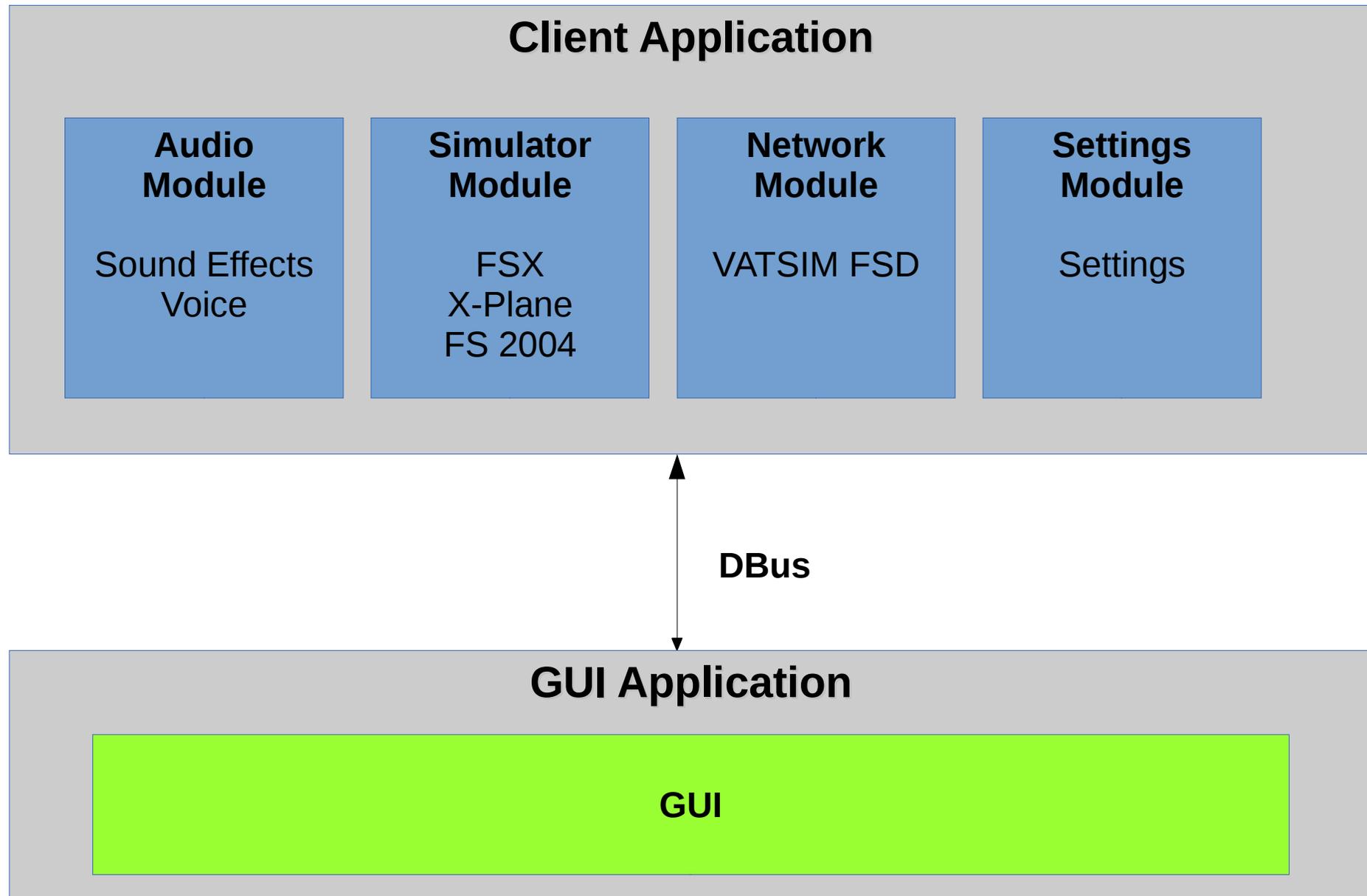
Deployment 2: Distributed

- Two executables

- Logic independent from GUI

- Can be deployed on one or two computers

Simulator

Core

Runtime

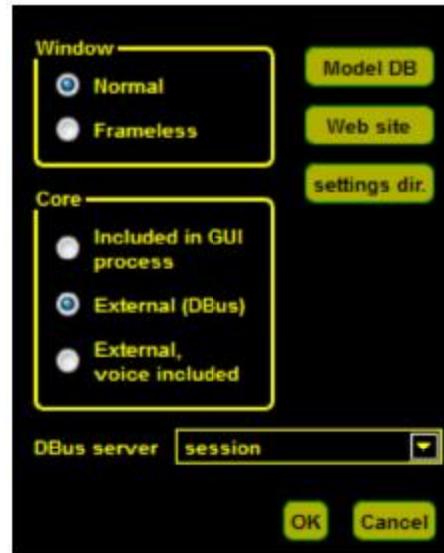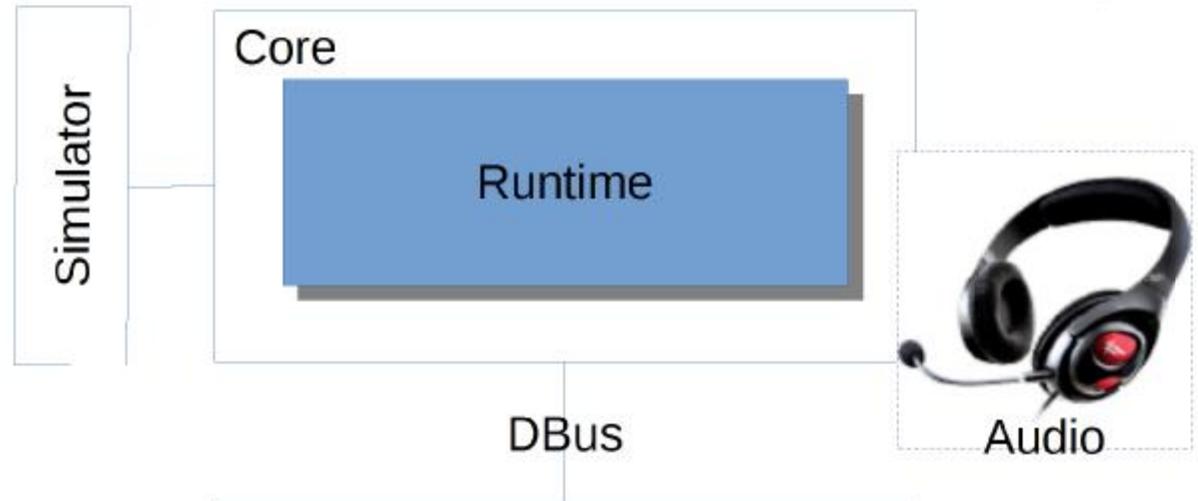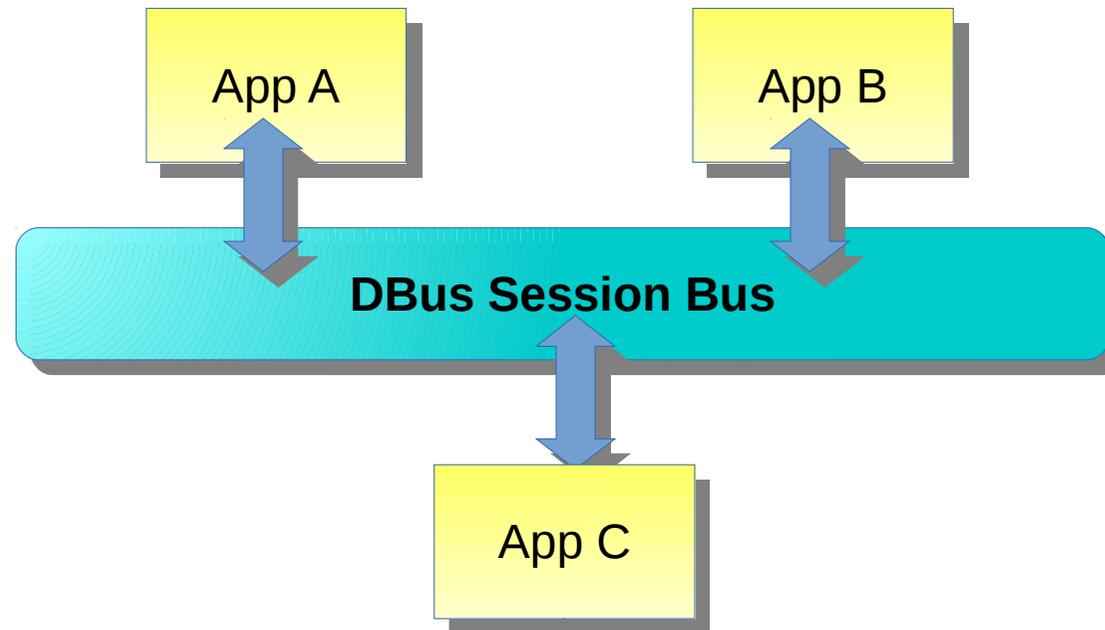DBus

GUI

Audio

Distributed client – Network

Computer 1

GUI

Audio Module

Sound Effects
Voice

TCP/IP (DBus)

Computer 2

Simulator Module

FSX
X-Plane
FS 2004

Network Module

VATSIM FSD

Settings Module

Settings

Deployment 3: Distributed

- Similar to Deployment 2

- Audio on runtime side

What is DBus?

App A

App B

DBus Session Bus

App C

DBus is a session server developed by Free Desktop

Different processes can communicate via a bus system
Publish & subscribe

Want to use DBus? Here you go...

Risk assessment

- DBus for distributed system could eventually prove inadequate

- People leave the project while it is still immature

- Multiple simulators approach becomes too much of a burden

- Jack of all trades, master of none?

  – Multiple platforms/simulators is nice, but is the client able to compete with specialized client for one simulator/platform

GUI – experiences / concept

- GUI based on Qt Widgets

- In the long term planned to switch to QML

  - QML is a descriptive UI markup language

  - First trials showed, QML is not yet mature enough for our project

    - Performance
    - Memory consumption

- GUI component can be deployed

  - As one executable, containing everything

  - Split into parts, even on a different computer

Challenges

- Platform independent GUI development
  - Qt does most of the work for us
  - Nevertheless, requires
    - A lot of testing
    - Sometimes workarounds, as not all GUI components behave 100% identical
- Wide range of screen sizes ►resizable GUI
  - Some might run the GUI on their simulator PC,
  - Some on an independent device such as a tablet

Challenges

- Multiple simulators

  – Requires different setup screens

- Plugins

  – Third party plugins occupy their own GUI
    components

General ideas

More information about network activity

General ideas

Or who is in the voice rooms

Model matching

- ## What is it?
  Finding the best visual representation of other pilots' aircrafts for your flight simulator

- ## Why is it needed?

  - We have different flight simulators

  - We have different model sets installed

- ## Is there an alternative to model matching?
  Yes, all parties rely on the same set of models (IVAO approach)

Free vs. fixed model sets

- Free

  – Unlimited number of models can be used

  – Mapping required, you never know what others have

- Fixed

  – No matching needed, as all users have same set

  – Maintenance: Set has to be provided for all simulators

- Remark: Both approaches can be combined

  – Fixed base set of models, as minimal common denominator

  – Own models on top

  – Requires maintenance + model matching

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Data transfer for model matching

- FSD (VATSIM protocol) sends:

  a) Aircraft ICAO code and/or derived data
  B737 L2J (land plane, 2 jet engines), M (WTC)

  – The airline ICAO code: DLH, SQC, ...

  a) The model name string via an extension
  "Cessna C172Standard"

- Challenge

  – Mapping between model and ICAO code needed
  (which ICAO code does my model have?)

  – Only works between same simulator and if same
  model is installed

Forward mapping:
Model to ICAO code

- Derive ICAO (aircraft + airline) code from model

  – Would be the easiest solution

  – But, unfortunately there are no reliable information.

  There is no standard how / and where such information are stored along with the information

- Solution

  – We create our own meta data
  Model ◄ ►ICAO code

  – This catalog can be generated

    - Locally

    - Centralized (database, Internet)

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Mapping database (idea)

- Users can register each model mapping once

  – From the pilot client

  – Via web interface

- Administrators checks and releases mapping

- Pilot client downloads mappings

- Pros:

  – One time effort

  – Consistent mappings

  – Community can participate

- Cons:

  – Administrative crew needed

  – Setup effort

  – Extra component

Model mapping DB

Aircraft ICAO codes

Home
ICAO codes
- Aircrafts
- Airlines
Mappings
- Map sim.->ICAO
- Sim.keys
- Change requests
- History
Admin
- Users
System
- Info page
- PHP info

Id: Admin (111111)
Roles: admin, bulk,
       authenticated,
       vatsimuser, dbuser

Logoff

Aircraft ICAO codes

Id	Designato	Manufacturer	Model	Typ	Engi	Engi	WTC	Rea	Leg	Created	Updated
		airbus									
647	A345	AIRBUS	A-340-500 Prestige	L	J	4	H	Y	N	2013-07-31 13:	2013-07-31 13
648	A400	AIRBUS	A-400M	L	TP	4	H	Y	N	2013-07-31 13:	2013-07-31 13
649	A320	AIRBUS	Prestige (A-320)	L	J	2	M	Y	N	2013-07-31 13:	2013-07-31 13
650	A388	AIRBUS	A-380-800 Prestige	L	J	4	H	Y	N	2013-07-31 13:	2013-07-31 13
651	A332	AIRBUS	KC-30	L	J	2	H	Y	N	2013-07-31 13:	2013-07-31 13
652	A342	AIRBUS	A-340-200 Prestige	L	J	4	H	Y	N	2013-07-31 13:	2013-07-31 13
653	A332	AIRBUS	A-330-200 Prestige	L	J	2	H	Y	N	2013-07-31 13:	2013-07-31 13
654	A320	AIRBUS	A-320 Prestige	L	J	2	M	Y	N	2013-07-31 13:	2013-07-31 13
655	A318	AIRBUS	A-318 Elite	L	J	2	M	Y	N	2013-07-31 13:	2013-07-31 13
656	A346	AIRBUS	A-340-600 Prestige	L	J	4	H	Y	N	2013-07-31 13:	2013-07-31 13

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Mapping DB, change request

Where do we go from here?

- More features

  - Model matching

  - Streamlined GUI

  - FS9 and X-Plane

  - More...

  - Release

- Limited resources

  - We are three people working in spare time

  - The code comes first

Opening the source

- Build on the faith of the community

- Observable progress

- Estimable work remaining

- Attract new contributors

  - But the code comes first

    - We need infrastructure

- Not at the expense of increasing the workload of the existing team members

You can help!

- Serious, reliable people with initiative
- Server hosts and sysadmins
  - Open source infrastructure – Jira, Gerrit, Jenkins...
  - FSD servers to test against
- C++ programmers – git-vcs experience
- GUI developers – Qt Widgets & QSS
- Artists – icons and GUI elements
- We will not hold your hand

You can help!

Or you help us in organizing things:

- Anybody who can provide a free root server?

- Anybody who can lead the Mac OS/X and iOS versions?

- We need airport data (ICAO code/position), or even better with gate positions

- Infrastructure based: Single sign on for VATSIM accounts would help a lot with the model matching database

What's in it for you?

- Be part of a team of friendly, professional, talented people doing what they love

- A lot of code to read (50,000 lines)

- Challenge and fun

- Freedom to solve problems the way you want, make decisions and be listened to

- Adherence to a rational coding standard

- Help to create something which will benefit our "hobby" for decades to come

- Nothing to sign

What that all means

- Best case
  - Many amazingly talented people come forward
  - Source code can be released this quarter
  - Development picks up speed

- Worst case
  - We continue with the status quo
  - We are dedicated to producing a quality client
  - It's ready when it's ready
  - Source code is released when it's ready

Brief history, then extrapolate

- Mar 2013 – Team assembled

- July 2013 – Version 0.1

- Feb 2014 – Version 0.2

- Mar 2014 – Version 0.3

- ??? 2014 – Version 0.4

- ...

- ??? 201? – Version 1.0

  – Speed increases as we learn how to work together

We are serious

about a pilot client for the future
of virtual air traffic simulation

Are you?

Credits to..

Web/Tool Support

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