



# MeeGo\* Based Operating System Technical Overview

Danny Zhang, Senior Engineering Manager  
Horace Li, Technical Marketing Engineer  
Intel Open Source Technology Center  
Software & Services Group

SFTS010

# Agenda

- MeeGo\* Architecture Overview
- MeeGo Tools & Development Model
- MeeGo Software Stack
- Summary and Resources

# MeeGo\* Strategy – Spans Multiple Segments

Netbooks



Connected TV



Handsets



IVI



Media  
Phone



*Intel® Atom™ Developer Program & AppUp<sup>(SM)</sup> Center*

MeeGo™

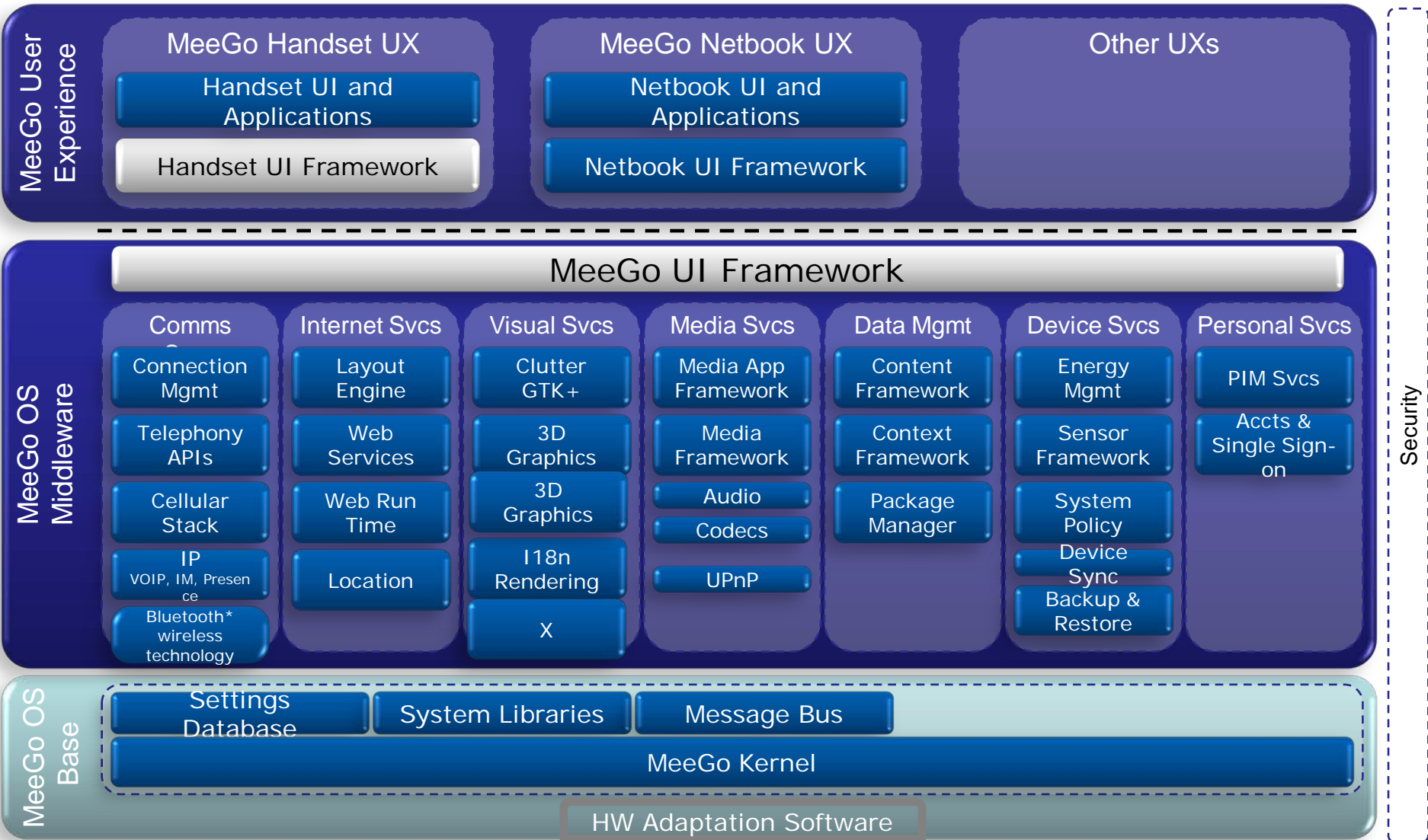
*MeeGo = Moblin™ + Best of Maemo*



*Platforms based on Intel processors*

*MeeGo is a continuation of the Intel Atom brand software strategy execution*

# MeeGo\* Architecture



# MeeGo\* on Intel® Atom™ Processor Features Overview



Segment  
Specific  
User  
Experiences

**connman**  
open source connection manager

Connection  
Manager for  
data  
connectivity

**ofono**  
open source telephony

Telephony  
Framework



Cloud-  
device sync  
of PIM Data



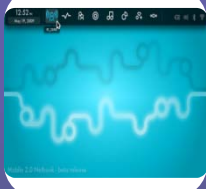
Integrated  
Social  
Networking

**Qt** MeeGo  
Code REST  
Google maps  
Device API's

Application  
Development  
Environment



Improved  
Power  
Management



Fastboot &  
Shutdown  
Optimization

**gstreamer**  
**Helix™**

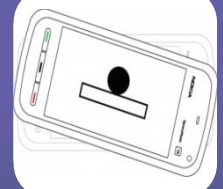
Support for  
Multiple  
Multimedia  
Framework



International-  
ization with UI  
guidelines



Gesture &  
MultiTouch  
Framework



Sensor  
Framework

Note: Some features listed may be segment-specific

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# MeeGo\* Application Development Environment

## MeeGo offers Qt\* and Web runtime for app development:

- Qt for native C++ and Web runtime for Web applications (HTML, JS, CSS, etc.)
- Qt and Web runtime bring cross platform development so apps can span multiple platforms
- Native development tool: Qt Creator
- Web development tools: plug-ins for standard web development tools



*MeeGo offers a complete set of tools for developers to easily and rapidly create a variety of innovative applications*

# Platform Development Tools

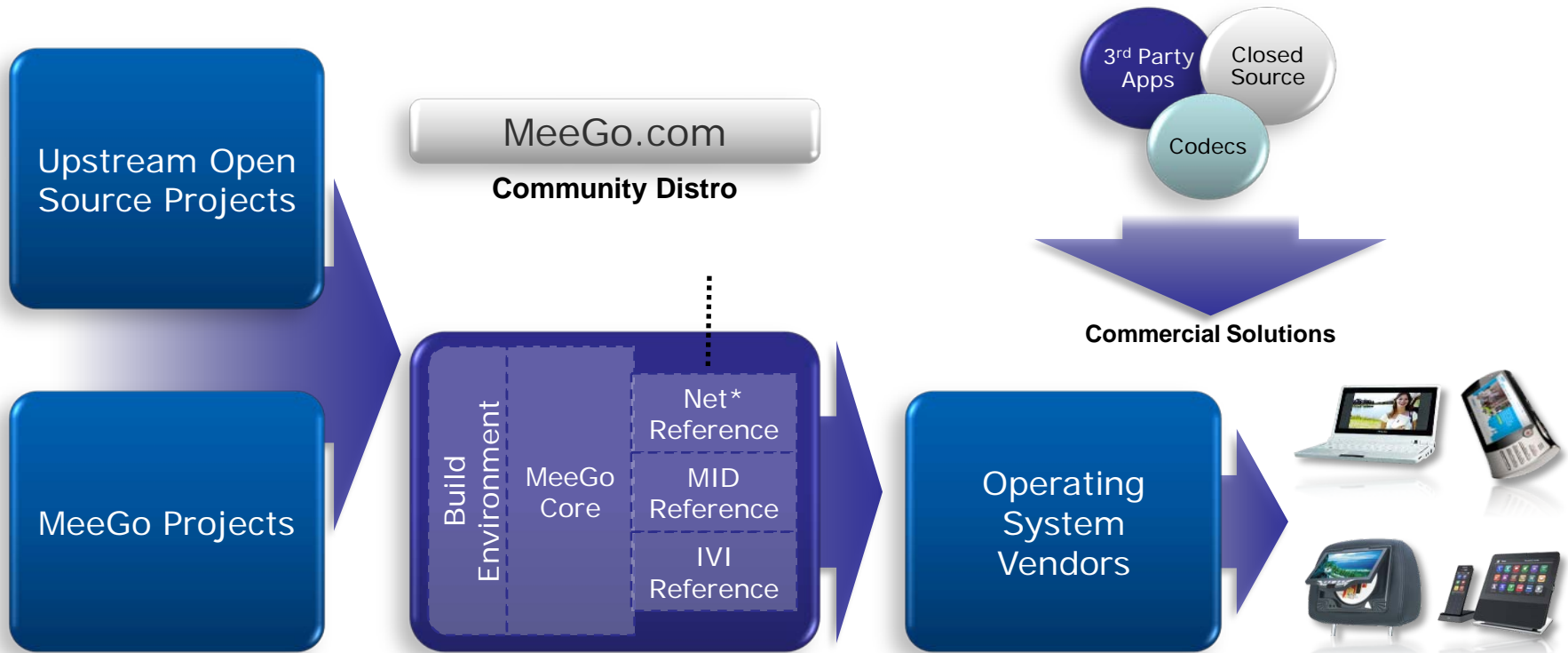
## Open Source Tools

- MeeGo\* Image Creator
  - Create custom target images for various boot formats
- GNU\* tools (gcc, gdb,...)
- PowerTOP\* (IA only)
  - Platform level power analysis and optimization tool

## Intel Commercial Development Tools (Intel® Architecture Only)

- Intel® C/C++ Compiler
- Intel® JTAG and application debuggers
- Intel® Integrated Performance Primitives (Intel® IPP)
- Vtune™ Performance Analyzer

# MeeGo\* Working Model



*MeeGo.com hosts the core technology development and open source distribution*  
*Commercial OSVs deliver customized "compliant" products*

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# HW Adaption Software & OS base



## HW Adaptation Software

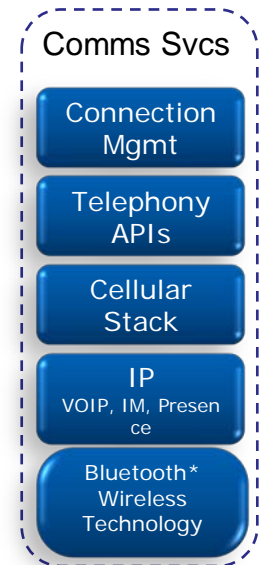
- Platform Kernel Drivers
- Kernel Core Architecture Patches
- Kernel Configuration
- X Software Core Architecture Patches
- X Software Configuration
- Modem Support
- Hardware Specific Media Codecs

## OS Base

- MeeGo Kernel
  - MeeGo uses a Linux\* kernel from kernel.org, with architecture specific configuration and patches (as needed). Drivers are provided for each supported platform.
- Settings Database
  - The central place for storing application preferences and configuration information
- System Libraries
  - System libraries include the common LSB libraries, glibc, glib, etc.
- Message Bus
  - D-Bus provides the message bus for application-to-application communication

# MeeGo\* Middleware: Comms Services

- Connection Management
  - ConnMan is used to manage data connections (WiFi, WiMAX, 3G, and connections via Bluetooth\* Wireless Technology)
- Telephony APIs
  - oFono\* provides the internal APIs for GSM/UMTS telephony applications. Telepathy provides the API framework for IP-based communication
  - Applications will use Qt\* APIs to access these services
- Cellular Stack
  - The cellular stack provides oFono\* plug-ins to support specific modems
- IP (VoIP, IM, Presence)
  - IP comms includes Telepathy plug-ins for specific instant messaging, voice-over-IP, and video-over-IP protocols
- Bluetooth\* Wireless Technology
  - BlueZ\* provides Bluetooth support including DUN, A2DP, headset, etc.



# MeeGo\* Middleware: Internet Services

- Layout Engine
  - The layout engine renders web content (HTML, XML, images, etc) for on-screen display.
  - The specific layout engine might vary by platform (e.g. WebKit/Chromium\* on netbook, Gecko/Fennec\* on handset)
- Web Services
  - The Web Services framework (libsocialweb) provides an extensible framework for exchanging data with social networking/social media sites.
  - It also includes libraries to make it easier to interact with RESTful web services (librest)
- Web Run Time
  - The Web Run Time provides an environment for building applications using web technologies such as Javascript\*, HTML, and CSS
  - The MeeGo web run-time is based on WebKit
- Location
  - Applications will be able to access the location services through Qt APIs.
  - On MeeGo, Qt\* location APIs are layered on GeoClue. GeoClue provides a framework for providing location information from multiple providers, including GPS, WiFi, cellular, and IP address location



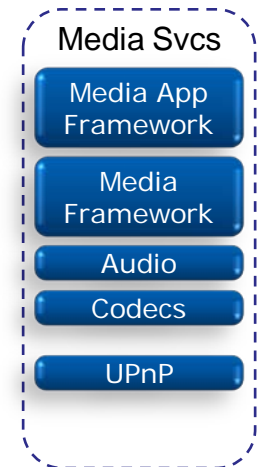
# MeeGo\* Middleware: Visual Services

- 3D Graphics
  - An implementation of the OpenGL\*/OpenGL ES specifications for rendering 3D graphics, with support for hardware-acceleration
  - Hardware acceleration features vary by platform
- 2D Graphics
  - The 2D graphics layer provides advanced 2D drawing capabilities with support for hardware acceleration
- i18n Rendering
  - The i18n rendering component supports layout and rendering of text with support for internationalization
- X
  - x.org provides an implementation of the X Window System, with architecture specific drivers, patches, and configuration as needed.



# MeeGo\* Middleware: Media Services

- Media Application Framework (MAFW)
  - The Media application framework provides a set of abstracted services that can be used to build a media player
- Media Framework
  - The Gstreamer\* media framework supports a wide range of media operations including audio and video playback, recording, streaming, and editing
- Audio
  - The audio subsystem includes audio routing and pulseaudio
- Camera
  - The camera subsystem supports both still and video cameras
- Codecs
  - GStreamer-compatible codecs are supported for encoding / decoding of audio and video. Codecs may optionally use hardware acceleration.
  - Only those codecs that do not require commercial licenses (e.g. Ogg Vorbis and Theora) will be part of the MeeGo base distribution.
  - Codecs for many popular audio and video formats (e.g. MP3, AAC, MPEG-4, H.264) require commercial licenses and will not be provided as part of the base MeeGo distribution.
- UPnP
  - GUPnP provides a framework for creating devices and control points that adhere to the Universal Plug-and-Play specifications



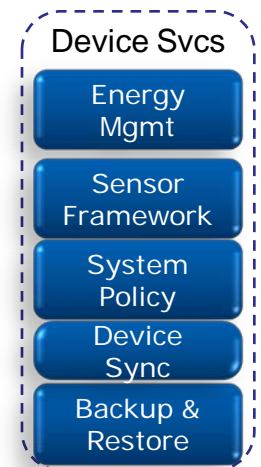
# MeeGo\* Middleware: Data Management Services

- Content Framework
  - Content framework provides indexing, meta-data extraction, and search capabilities for a variety of data types, including media files, documents, etc.
- Context Framework
  - The context framework provides a subscribe and publish mechanism for information about device context such as cable status, phone position, battery level, etc.
- Package Manager
  - The RPM package manager is used to install and remove packages



# MeeGo\* Middleware: Device Services

- Energy Management
  - Energy management controls energy-related device functions such as battery charging
- Sensor Framework
  - The sensor framework exposes a common, consistent interface for sensors with pluggable support for multiple sensor types including accelerometers, ambient light sensors, etc.
- System Policy
  - System Policy provides is the central place for managing device wide policy information such as audio routing, profiles, device behavior during emergency calls, etc.
- System Profiles
  - The system profiles component manages the system-wide device profiles (for example, ring and vibrate alert levels)
- Device Sync
  - Device sync provides data synchronization with both servers and directly with other devices using SyncML
- Backup and Restore
  - Backup and Restore provides services for saving and restoring both user data and device image to an external backup device



# MeeGo\* Middleware: Personal Services

- PIM Services
  - PIM Services provides a common interface for accessing and storing PIM information (address book, calendar, tasks, and notes)
  - Will use Evolution Data Server\* (EDS) in the near term
- Accounts & Single Sign-on
  - Accounts & Single Sign-on stores user account information, including information required to implement single sign-on for both local and remote services



# MeeGo\* UI /Application Toolkits

## MeeGo UI Framework

- Supports native (C/C++) and web (HTML, Javascript, CSS) development
- MeeGo UI Toolkit
  - The MeeGo UI toolkit is the primary toolkit for developing applications and is based on Qt\* with specific enhancements and additions such as the Qt Mobility APIs
- GTK\* and Clutter
  - GTK\* and Clutter are provided for application compatibility for existing Maemo\* and Moblin™ applications
  - All new UI and application development work will be based on the MeeGo UI toolkit

# Qt\* Features

- Intuitive C++ class library
- Portability across desktop and embedded operating systems
- Integrated development tools with cross-platform IDE including for MeeGo\* and Symbian\*
- High runtime performance and small footprint on embedded



# Qt\* Creator - Cross-Platform Qt IDE



[Qt Creator](#) is a cross-platform Qt IDE. It is available as a stand-alone package or in combination with the Qt libraries and development tools as [a complete SDK](#).

Qt Creator includes:

- An advanced C++ code editor
- Project and build management tools
- Integrated, context-sensitive help system
- Visual debugger
- Code management and navigation tools

[GUI Builder](#)

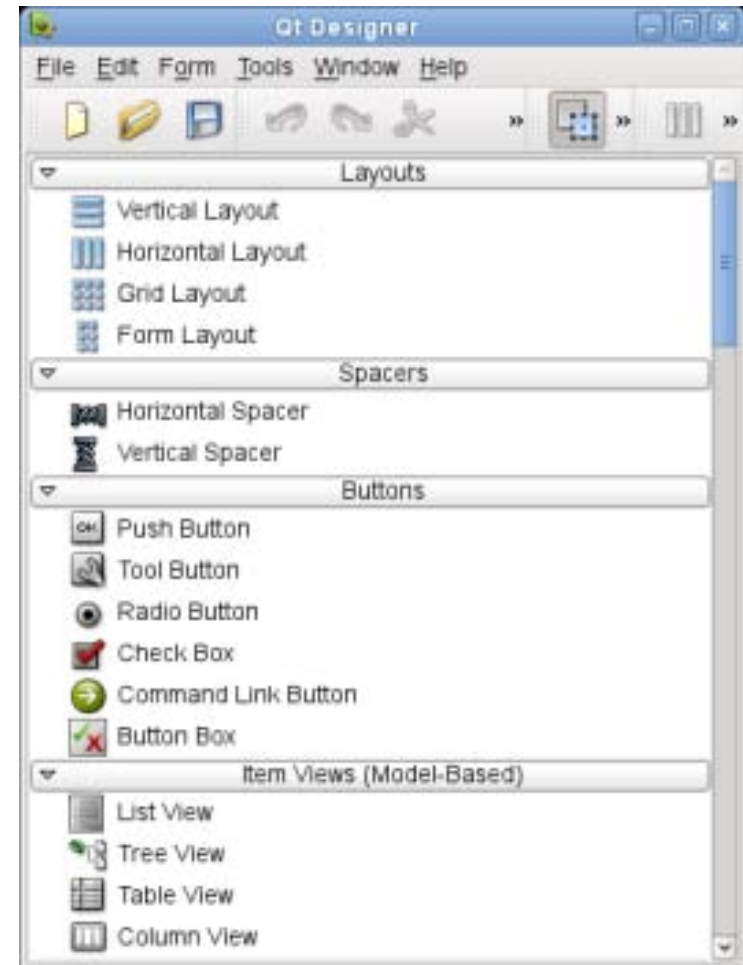
[Internationalization Tools](#)

[Customizable HTML Help System](#)

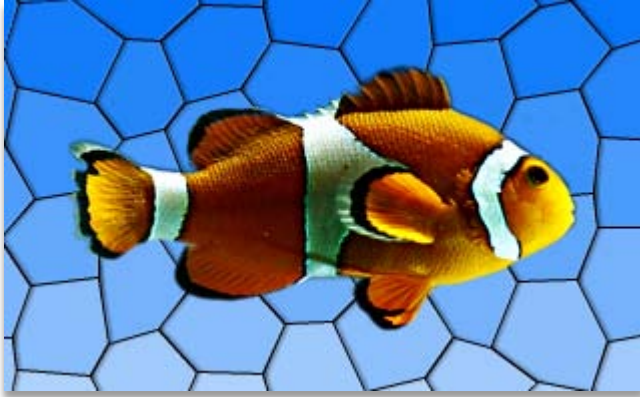
[Integration/Add-in for Eclipse and Visual Studio](#)

# Qt\* Class Libraries

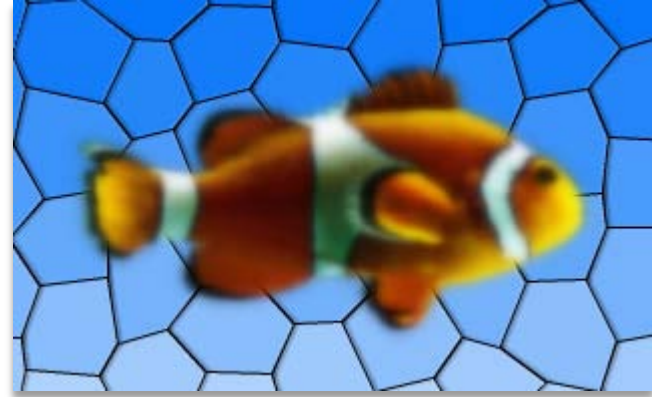
- The modular Qt C++ class library provides a rich set of application building blocks, delivering all of the functionality needed to build advanced, cross-platform applications.
- <http://qt.nokia.com/products/developer-tools>
- <http://qt.nokia.com/developer>



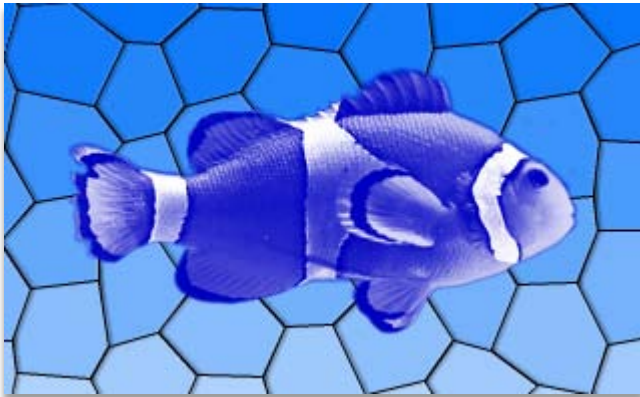
# Qt\* Graphics Effects



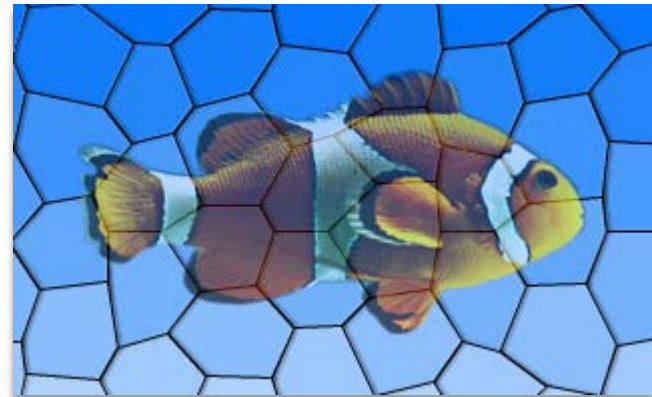
Solid



Blur



Colorize



Opacity

# Qt\* Animation Framework

- Enables smooth, animated transitions between various UI elements and states
- Supports animations that run in series or in parallel
- Supports various types of easing curves to control the animation such as linear, elastic, quadratic, cubic, and bounce. Custom easing curves can also be created to enable unique visual effects.



# Qt\* WebKit Web Runtime

- Modern Qt WebKit module incorporating many features found in open source WebKit project's trunk
- Support for HTML5 features
  - Database, Canvas, App Cache, Workers, Local and Session Storage, OnLine / Offline
- Support for CSS3 / WebKit vendor extensions
  - Rounded corners, masks, animations, many more
- Use JavaScript\* to access device and platform services
- Cross-platform development environment including MeeGo\* and Symbian\*

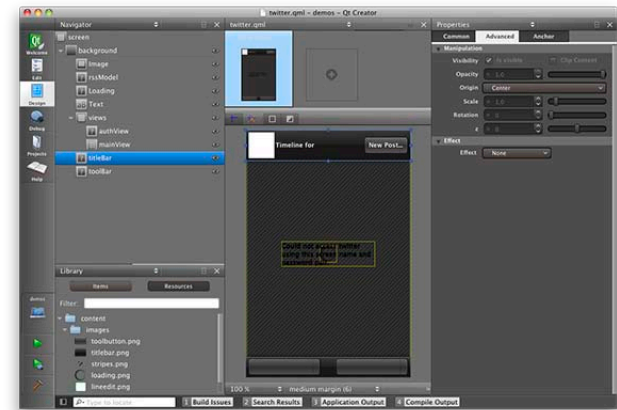
# Qt\* 4.7 Preview

- New Classes, Functions, Macros, etc.
  - New classes, elements, functions, macros, and other items introduced in Qt 4.7
- Declarative UI development with Qt Quick
  - Create animated and fluid user experiences
  - Provides the underlying engine – QtDeclarative.
  - Improved Qt Creator 2.0 to support drag-and-drop QML UIs editing
- Network Bearer Management
  - System connectivity state control, Network online/offline management, network listing, Roam transparently between access points
  - New Bearer Management API in the QtNetwork module
- Multimedia - playback and declarative elements
  - Multimedia support for Quick

# Qt\* Quick

A high-level UI technology that creates animated, touch-enabled UIs and lightweight applications. It includes:

1. A visual editor in Qt Creator to cooperate, working on the same code in an iterative approach .
2. QML (Qt Meta-Object Language), an easy to use, declarative language  
QtDeclarative: a new module in the Qt library that enables a new declarative programming approach
3. No C++ programming skills are needed to use Qt Quick



# Summary

- MeeGo\* is the next step in the evolution of Moblin™
- MeeGo = Best of Moblin + Best of Maemo
- MeeGo is a fully open source software platform
- MeeGo offers a growing ecosystem of applications and services
- Intel AppUp<sup>(SM)</sup> Center provides the channel to market for Intel-based devices from OEMs/SPs

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