



An Introduction to Qt

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What is Qt?

- **Qt** is a comprehensive C++ framework for developing cross-platform GUI applications using a "write once, compile anywhere" approach.



Qt Licenses

- Proprietary License
- Until version 1.45: FreeQt
- Version 2.x & 3.x: QPL (not GPL comp)
- Version 4 [X11/MacOs/Windows]: GPL (2005)
- Version 4.5: GNU LGPL (January, 2009)



Platforms

- Linux/X11 – Qt for X Window System (Unix / Linux)
- Mac OS X – Qt for Apple Mac OS X. Support for applications on top of Cocoa APIs
- Windows – Qt for Microsoft Windows
- Embedded Linux – Qt for embedded platforms (PDA, Smartphone, etc.)
- Windows CE – Qt for Windows CE
- Symbian – Qt for the Symbian platform. Qt is to replace Nokia's Avkon as the supported UI SDK for the development of Symbian applications.
- MeeGo – Qt for MeeGo

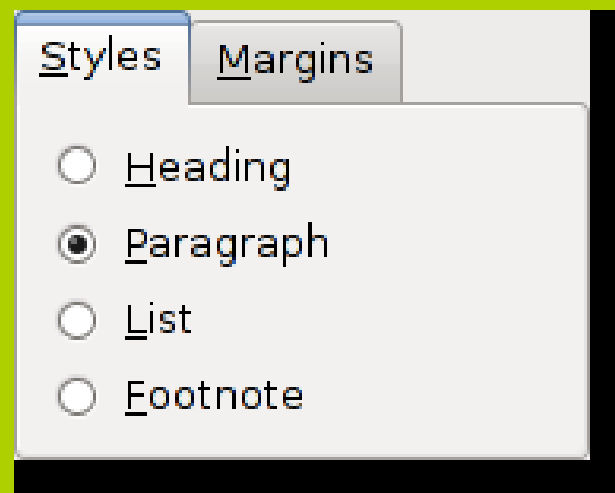
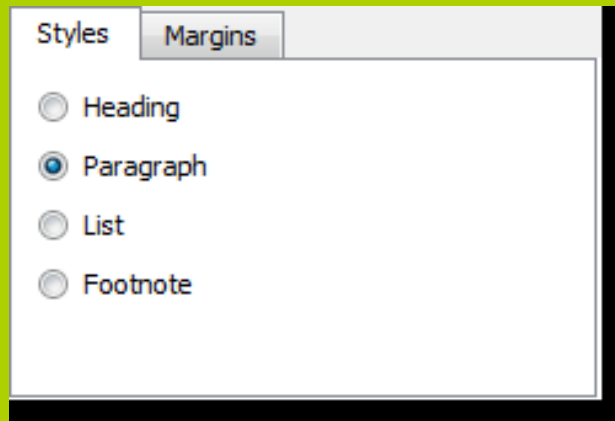
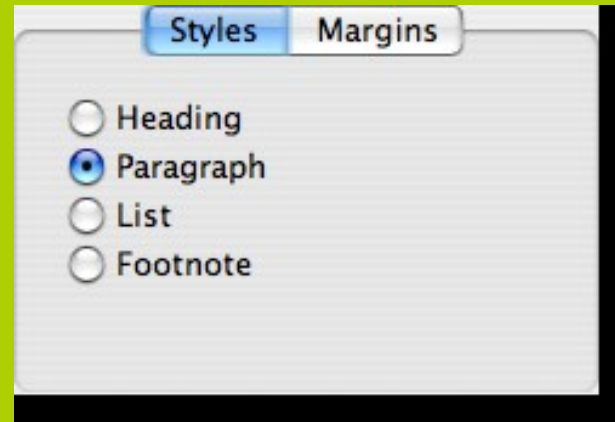
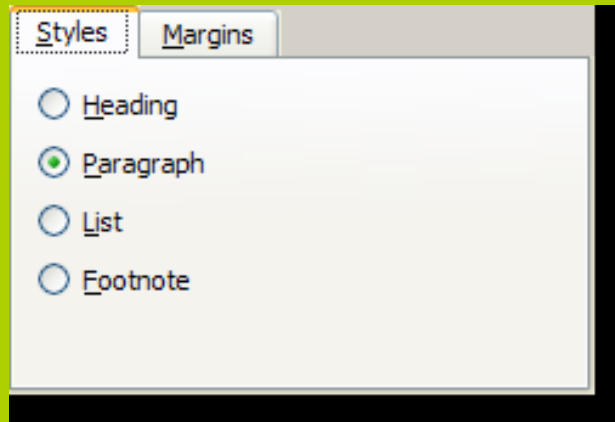
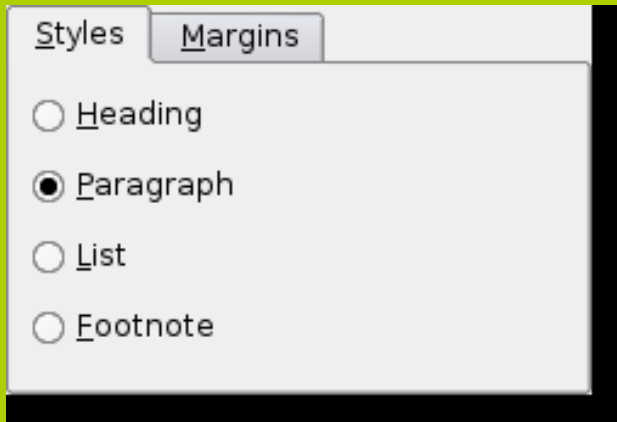


External ports

- Qt for OpenSolaris – Qt for OpenSolaris
- Qt for Haiku – Qt for Haiku OS
- Qt for OS/2 – Qt for OS/2 eCS platform.
- Qt-iPhone – Experimental development of Qt for the iPhone.
- Android-Lighthouse – Experimental development of Qt for Android.
- Qt for webOS – Experimental development of Qt for webOS on Palm Pre.
- Qt for Amazon Kindle DX – Experimental development of Qt for Amazon Kindle DX.



Use of native UI-rendering APIs





Uses: Environments

- **KDE**, a popular desktop environment for Unix-like operating systems
- **MeeGo**, Linux-based open source mobile operating system
- **Motorola A760**, uses Qt/Embedded in its UI
- **OPIE**, a completely open source based graphical user interface for PDAs and other devices running Linux.
- **Qt Extended Improved**, an application platform for Embedded Linux-based mobile computing devices
- **Symbian** from version 4
- **Antico**, a desktop environment



Uses: Applications

- **Autodesk Maya**, 3D modelling and animation software
- **Google Earth**, a 3D map program
- **LyX**, a GUI frontend to LaTeX
- **Opera**, cross-platform internet browser
- **Skrooge**, a personal finance manager
- **Skype**, a P2P VOIP application
- **SMPlayer**, a multiplatform multimedia player front-end for Mplayer.
- **VirtualBox**, a PC virtualization application
- **VLC Media Player**, an open source media player.
- **Xconfig**, Linux Kernel configuration tool



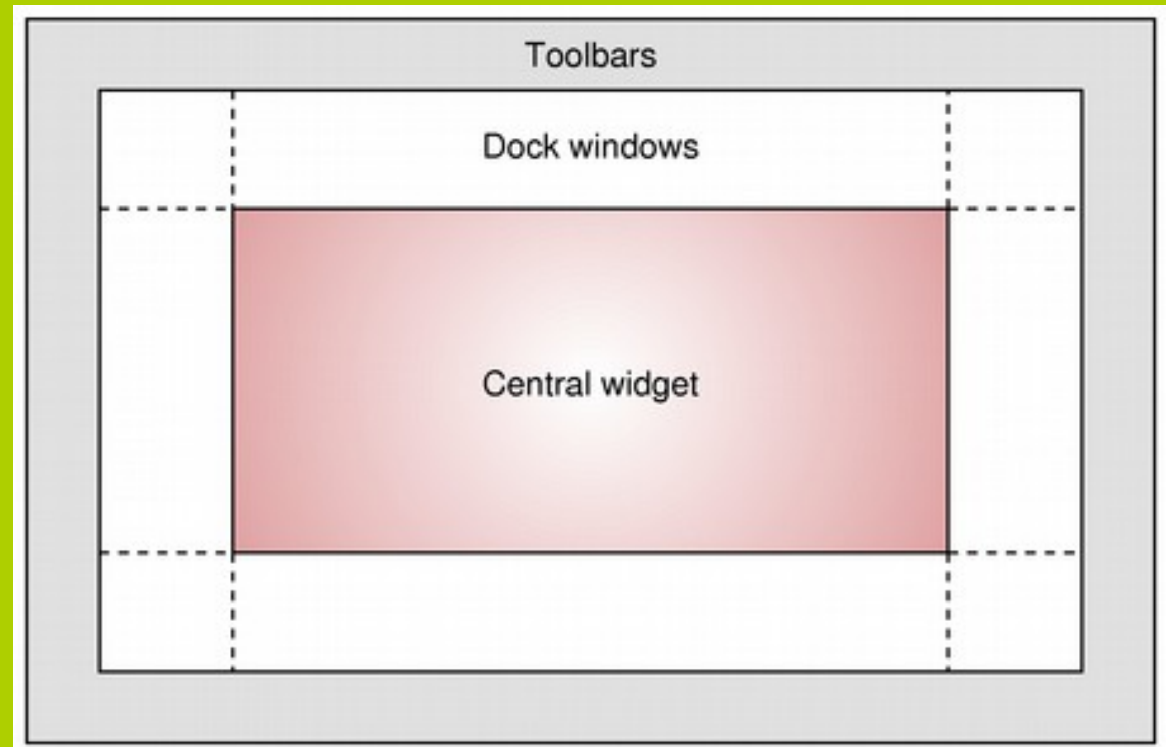
Installation

- GNU/Linux
- Windows



Main Window Classes

- QMainWindow
- QDockWidget
- QToolBar





Meta-Object System

- Based on three things:
 - 1) QObject Class
 - 2) O_OBJECT macro
 - 3) Meta-Object Compiler (moc)



Qt's Property System

- Property Declaration:

```
Q_PROPERTY(QDate date READ getDate WRITE setDate)
```

- Dynamic Properties



Signals & Slots



- `QObject::connect(`
 SENDER, SIGNAL(Function(int)),
 RECEIVER, SLOT(Function(int)));



QMake

```
$ qmake -project
```

```
qmake -o Makefile project.pro
```

```
qmake -tp vc -o hello.dsp project.pro
```

```
CONFIG += qt debug
```

```
HEADERS += hello.h
```

```
SOURCES += hello.cpp main.cpp
```

```
FORMS += form.ui
```



Qt Creator



Qt Designer



Qt Assistant

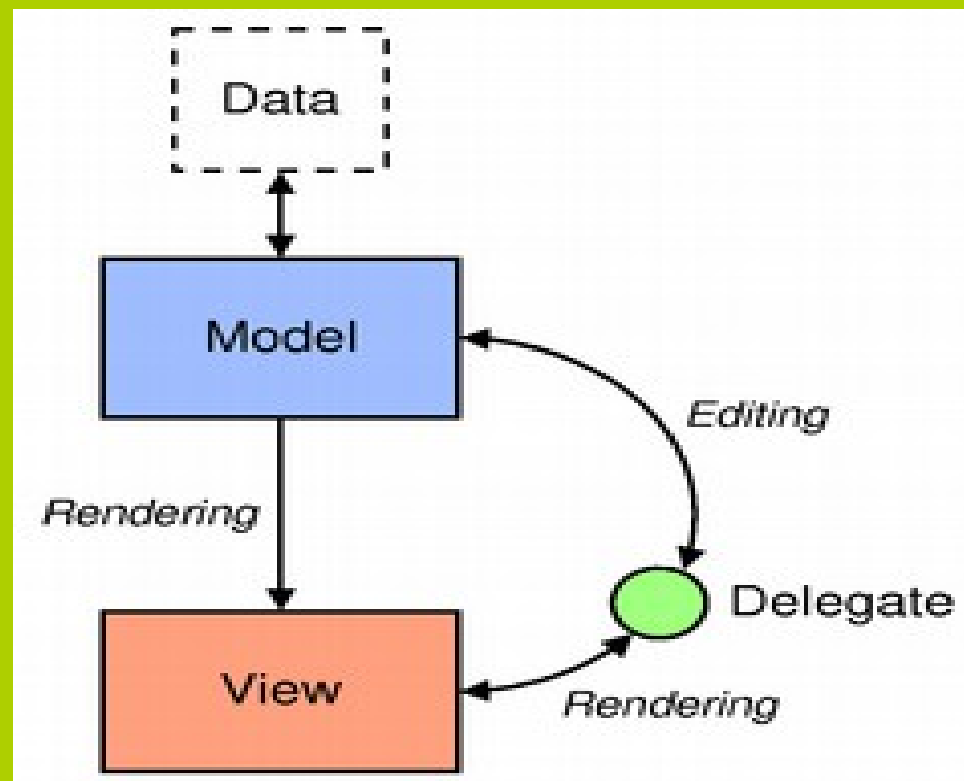


Qt Linguist



The Interview Framework

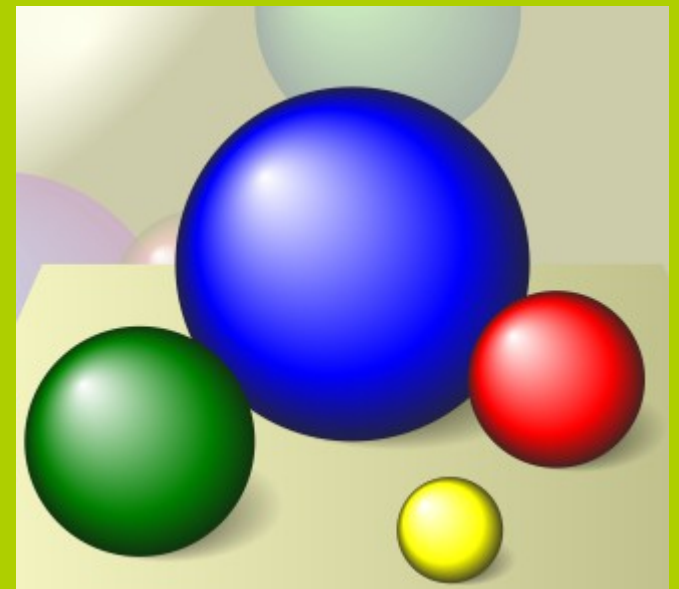
- A model/view framework for Qt applications based on the well known Model-View-Controller (MVC) design pattern





The Arthur Paint System

- Architecture (QPainter, QPaintDevice, and QPaintEngine)
- Extensive Use of Native Graphics Operations
- SVG Rendering Support





Phonon Module

- **Code:**

```
Phonon::VideoPlayer *player = new  
Phonon::VideoPlayer(Phonon::VideoCategory, parentWidget);  
  
player->play(url);
```

- **License: Just LGPL**



QtDBus module

- The QtDBus module is a *Unix-only library* that you can use to perform Inter-Process Communication using the D-Bus protocol.



QtNetwork Module

- The QtNetwork module provides classes to make network programming easier and portable.
- **QNetworkAccessManager**: Allows the application to send network requests and receive replies
- **QTcpServer**: TCP-based server
- **QTcpSocket**: TCP socket
- **QUdpSocket**: UDP socket



QtWebKit

- QtWebKit is based on the Open Source WebKit engine.

- Architecture

```
QWebView *view = new QWebView(parent);  
view->load(QUrl("http://qt.nokia.com/"));  
view->show();
```

- Netscape Plugin Support



QtOpenGL Module

- OpenGL is a standard API for rendering 3D graphics. OpenGL only deals with 3D rendering and provides little or no support for GUI programming issues. The user interface for an OpenGL application must be created with another toolkit, such as Motif on the X platform, Microsoft Foundation Classes (MFC) under Windows, or Qt on both platforms.



QtSql Module

- The SQL classes are divided into three layers:
 - 1)Driver Layer :
 - *QSqlDriver*
 - 2)SQL API Layer :
 - *QSqlDatabase, QSqlQuery, QSqlRecord*
 - 3)User Interface Layer :
 - *QSqlQueryModel, QSqlTableModel*



Thread Support in Qt

- Low level development (QThread)
- High level development (QtConcurrent)



QtTest Module

- The QtTest module provides classes for unit testing Qt applications and libraries.



The Animation Framework

- The animation framework is part of the Kinetic project, and aims to provide an easy way for creating animated and smooth GUI's. By animating Qt properties, the framework provides great freedom for animating widgets and other QObjects. The framework can also be used with the Graphics View framework.



Some Example Applications



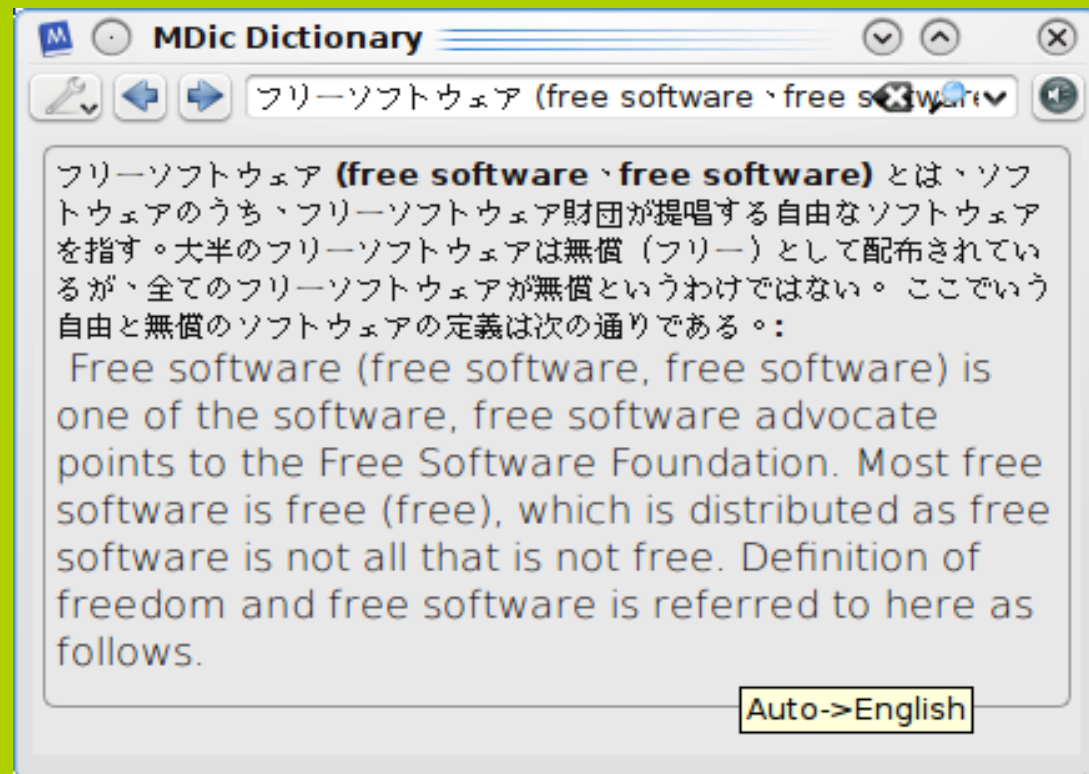


MDic Dictionary

- <http://mdic.gnufolks.org>
- Programming language: C++
- Development platform: Qt4

- Developers:

- Majid Ramezanpour
- Mehrdad Momeny

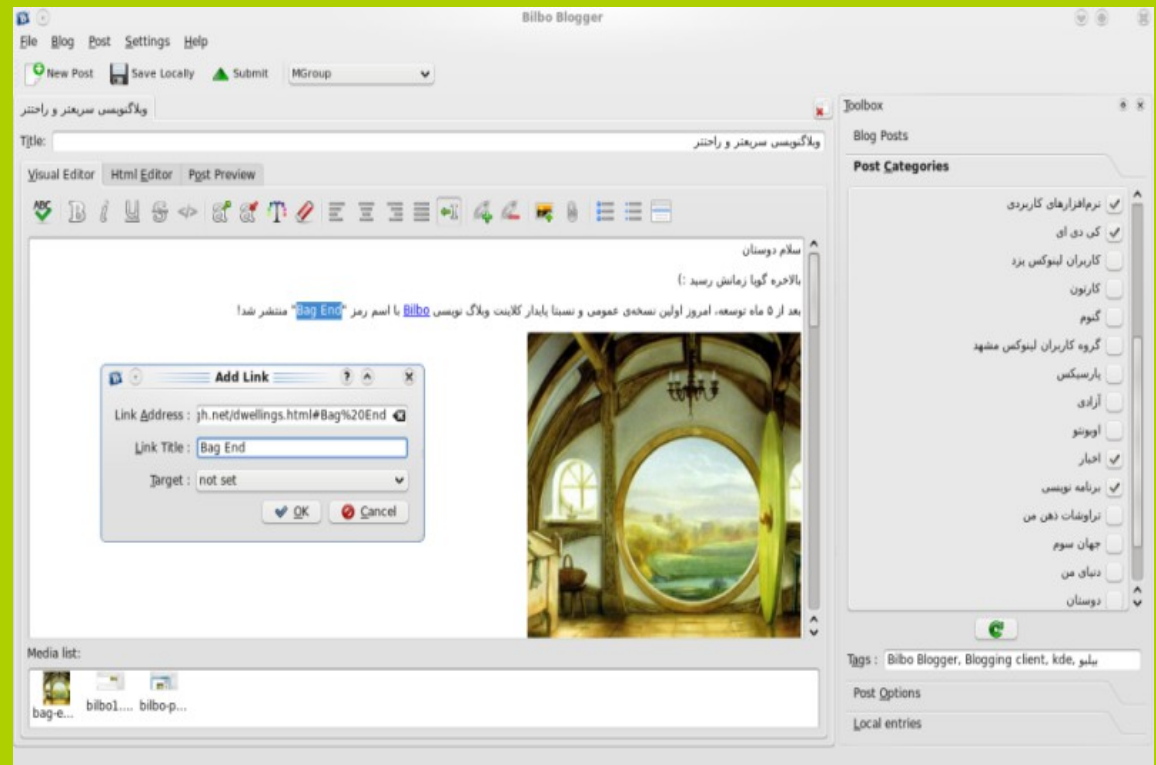




KDE Blogging Client (Blogilo)

- <http://blogilo.gnufolks.org>
- Programming language: C++
- Development platform: Qt4 / KDE4

- Developers:
 - Golnaz Nilieh
 - Mehrdad Momeny

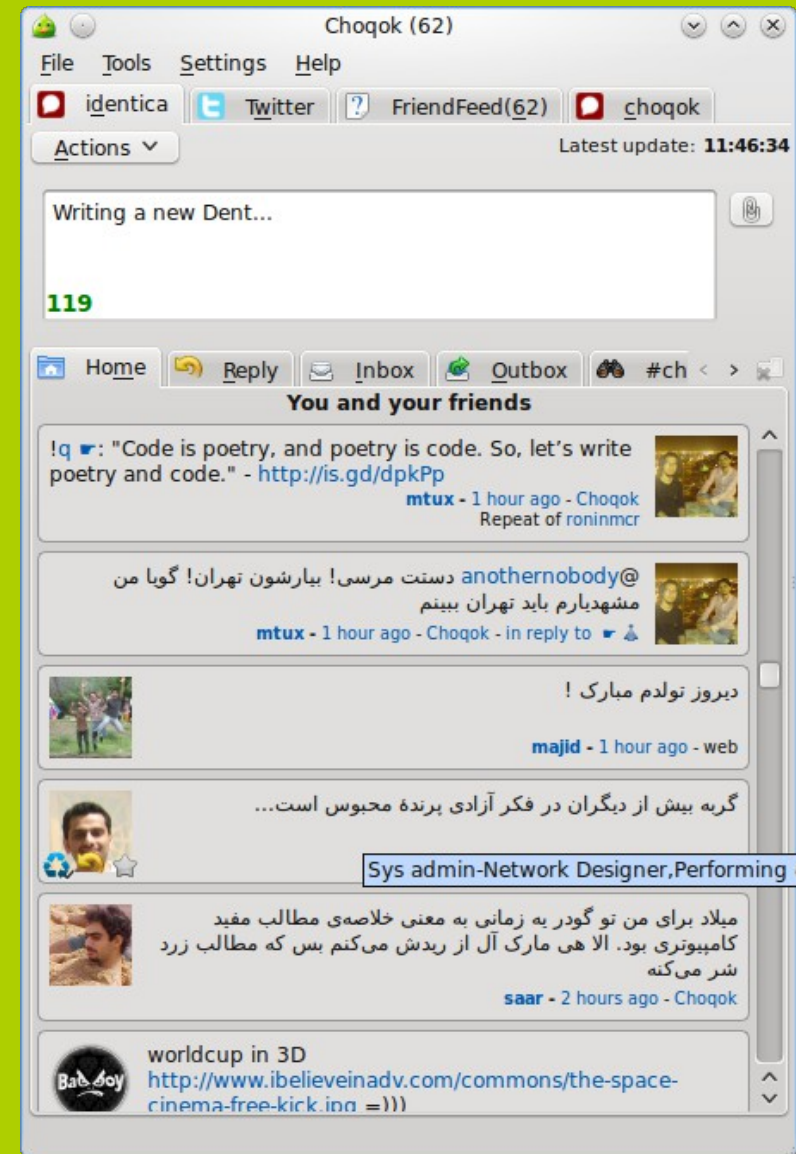




KDE MicroBlog Client (Choqok)

- <http://Choqok.GnuFolks.org>
- Programming language: C++
- Development platform: Qt4 / KDE4

- Developers:
 - Mehrdad Momeny
 - Andrey Esin
 - Others





Many Thanks To

- Richard M Stallman
- TrollTech and Nokia Guys
- KDE Developers
- IsfahanLUG
- And Sajjad Baroodkoo