Accelerating UI development
State of the industry
Product teams today

Graphical-minded engineer
One person does all
Serialized workflow that leads to product delays or shipping with suboptimal UI
Product teams today

**Graphical-minded engineer**
One person does all

**Inside UI team**
Designers and developers together

**Outsourced UI team**
Interfaces with your team
Storyboard Fundamentals
Storyboard Connector

- Graphically define events and payload between UI and backend
- Export C/C++ headers for event definition to prevent version issues
- Quickly verify events and data in UI without any code or need to build a simulator
Communicating with the UI

Front End UI & Logic

Front End Channel

SBIO uses Lua and C code as Interprocess Communication

Back End Channel

Back End Logic

Hardware

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TRIADEM SOLUTIONS
Storyboard Application Development

Storyboard Designer

Export To Model

DESKTOP - Development

EMBEDDED TARGET - Execution

Storyboard Engine (executable)

Interpret Model

Transfer model file and asset content (i.e., images, fonts) to embedded target system.

No Code Generation Performed
Parallel workflow streamlines work between roles
About Crank Software

Crank Software – Storyboard Suite

UI Design and Development
Design Once. Run Everywhere
Architecture and Scalability

Adopt a clean architecture, separating the UI from the backend

Storyboard
• Runtime Engine Model
• Event Driven
• Enforces UI architecture best practices
OpenGL ES Support

- Fully accelerated OpenGL ES graphics pipeline
- Combine and animate 3D models within 2D UI elements
- Built in 3D screen transitions
- Support for custom shaders
Storyboard is completely event driven and this makes testing a much simpler process. To assist in the effort even further Storyboard provides some helpful plugins including:

- Event Capture / Playback
- Screen Capture
- Performance Tracing
- Debug Logging
Why Storyboard is different

- Supports designers and engineers equally with functionality and workflow
- Embraces design change and eases iterative development
- Built exclusively for embedded systems to drive performance and enhance user experience
Storyboard Suite
The designer’s assets are pulled directly into Storyboard and ready to apply movement and behavior.
Photoshop import

- Photoshop content can be brought directly into Storyboard
- All content from the PSD is applied to the model within seconds
  - Hierarchy
  - Naming
  - Position
  - Fonts
  - Visibility
- Designers are left right where they left off in Photoshop with a very familiar layout
Application
Container for the entire user interface and is a broker for all visual user interaction

Storyboard
Application Architecture

Screen
Visible area on display. Only one screen is visible at a time.

Layer
One or more layers are composited to make up a screen. Layers can be used on more than one screen and may map directly to hardware.

Control
A clipped area that renders content (ie images, text, fill color). Rendering is performed using render extension plugins. Each component can have data and actions associated with it.
Demo
Iterative Design

- Design change is inevitable and leads to richer user experience
- Update designs as often as required with Photoshop Re-import functionality
Graphical compare

• Compare the UI model the same as source code
• Structured presentation matches design structure
• See all attribute changes with a comparison view
• Merge all content or cherry pick individual changes
Scalable

- Optimized for multiple embedded platforms
- From MCUs to high-performance MPUs, designed to maximize efficiency
Scalability

Storyboard Engine

- Software Renderer
- 2D Optimized
- Hardware Layers
- Multi-Core
- 3D GPU

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Triadem Solutions
Target Deployment Decision Tree

Full OS (RTOS/Desktop)
Linux/QNX/Windows/WinCE/MacOS

OS?

RT Executive
FreeRTOS/MQX/UCOS/ThreadX

Load From File System?

Yes

No (ie SBVFS)

Draw Images From Flash?

No

Yes

SDK Distribution

Exe Distribution

Model → Filesystem
Assets → Filesystem
Raw Images → RAM
Plugins → Dynamic
Launcher → Executable

Model → Filesystem
Assets → Filesystem
Raw Images → RAM
Plugins → Static
Launcher → C Function

Model → Code
Assets → Code
Raw Images → RAM
Plugins → Static
Launcher → C Function

Model → Code
Assets → Code
Raw Images → Flash
Plugins → Static
Launcher → C Function

No Recompile on Model Change

Recompile on Model Change

No Recompile on Option Change

Recompile on Engine Option Change

High RAM, Low Flash/Storage usage

Low RAM, High Flash usage

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**Executable Distribution:** Windows/Linux/QNX/MacOS/WinCE

**Storyboard Engine:**
- Model: *.gapp
- Assets: .lua,.png,.ttf

**Content Distribution**
- Model stored in filesystem
- Assets stored in filesystem
- Plugins loaded dynamically as shared objects from filesystem (*.dll, *.so)
- Images decoded from compressed format to display format in RAM
SDK Distribution: FreeRTOS/MQX/UCOS/ThreadX/… WITH Filesystem

Content Distribution
- Model stored in filesystem
- Assets stored in filesystem
- Plugins linked to sbengine_task; sbengine_task linked into system image
- Images decoded from compressed format to display format in RAM
**SDK Distribution:** FreeRTOS/MQX/UCOS/ThreadX/… NO Filesystem

**Content Distribution**
- Model stored in code: global variable
- Assets stored in code: Storyboard Virtual Filesystem (sbvfs)
- Plugins linked to sbengine_task; sbengine_task linked into system image
- Images:
  - Stored in flash compressed (smaller storage) and decoded to RAM
  - Stored in flash decoded (larger storage) and used in place (may be slower)
How is Storyboard Different?

- Designer Oriented
- Iterative Design
- Team Collaboration
- Built for Embedded

PSD-Import & Re-Import