CTK Plugin Framework

Technical Introduction

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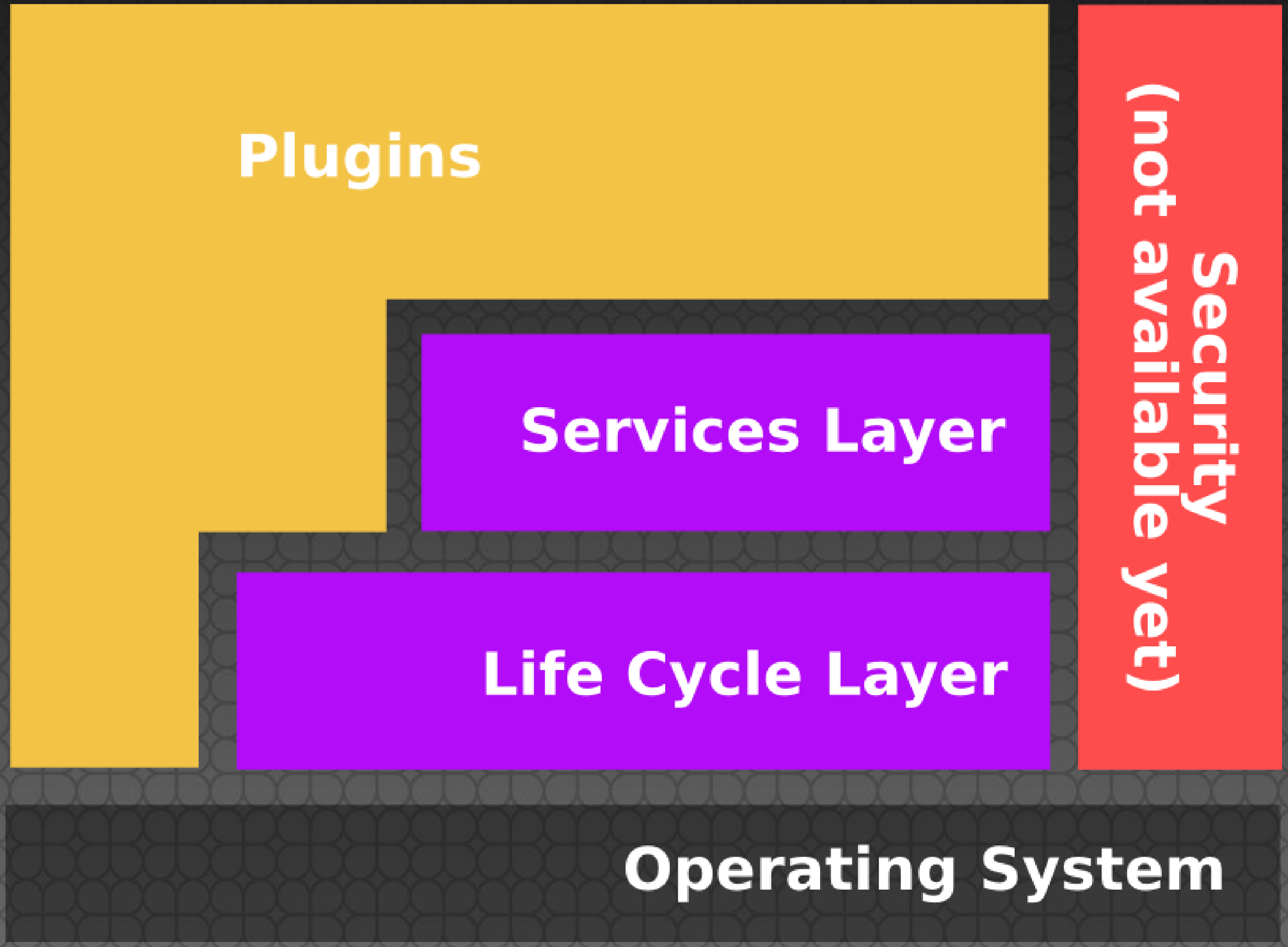
Today's Topics

1. About OSGi
2. Architecture
3. The CTK Plug-in
4. Programming Basics
5. Dealing with services

About OSGi

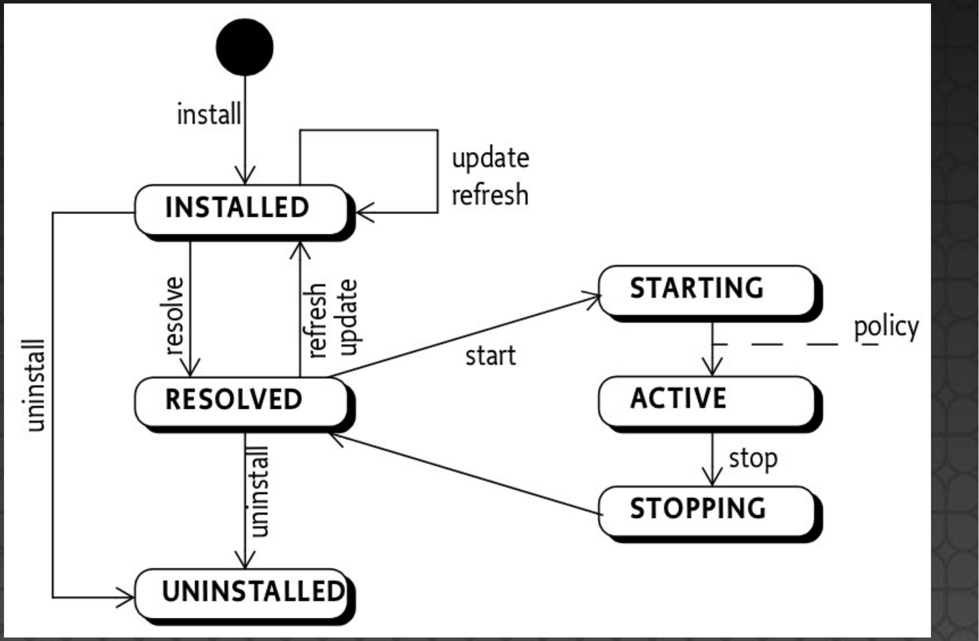
- The OSGi Alliance is a non-profit corporation founded in March 1999.
- More than 35 companies from various areas
- Roots in embedded systems
- The OSGi specification is at Release 4 with numerous implementations in Java
- Specification for the core framework and a compendium of service interfaces

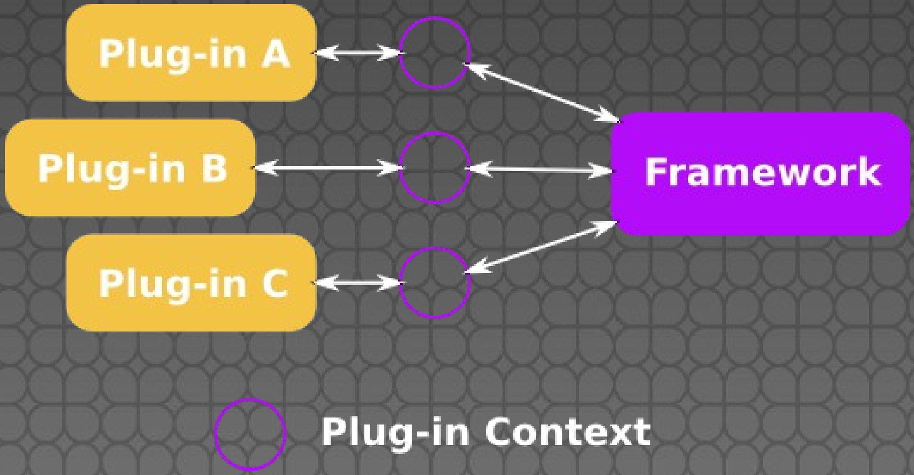
Architecture



Architecture – Life Cycle

- A plug-in is started by the *Plugin Activator* class.
- The Activator gets a *Plug-in Context* which represents the *Framework*.
- Plug-in Context objects should not be shared.





Architecture - Services

- The Framework provides a dynamic service model for communication between plug-ins
- Active plug-ins may (un)register 0 or more services with the Framework at any time
- A service registration is a published interface with optional registration properties
- Service references are obtained from the FW by interface and filter expressions
- The Framework publishes service lifecycle events

The CTK Plug-in

- A plug-in is a shared library with additional meta-data and resources
- It must provide a Plugin Activator class which is called by the Framework
- The FW invokes the start method when the plug-in enters the ACTIVE state
- The FW invokes the STOP method when the plug-in leaves the ACTIVE state

The CTK Plug-in

Each plug-in receives a unique ctkPluginContext for accessing the FW.

```
class MyActivator : public QObject, public ctkPluginActivator
{
  Q_OBJECT
  Q_INTERFACES(ctkPluginActivator)

public:
  void start(ctkPluginContext* context)
  { myPC = context; }

  void stop(ctkPluginContext* context);

private:
  ctkPluginContext* myPC;
};
```

Programming Basics

Providing a Service

- Services are registered with the FW through the Plug-in Context
- (Un)Registration may be done at any time

```
void registerSomeService() {
  mySomeService = new SomeServiceImpl();
  ctkDictionary props;
  props.insert(“myvalue”, 20);
  mySR = myPC->registerService<SomeService>(someServiceImpl, props);
}

void unregisterSomeService() {
  mySR.unregister();
}
```

Consuming a Service

- Services are retrieved from the FW through the Plug-in Context
- The FW returns a ctkServiceReference object which can be kept for future ref.
- Consumers must unget the service ref.

```
void consumeSomeService() {
  ctkServiceReference sr = myPC->getServiceReference<SomeService>();
  if (sr) {
    SomeService* si = myPC->getService<SomeService>(sr);
    if (si) {
      // ...
      myPC->ungetService(sr);
    }
  }
}
```

Using Service Listeners

- Service listeners can be (un)registered
- A filter can be specified

```
class A : public QObject {
  Q_OBJECT

slots:
  void someServiceListener(const ctkServiceEvent& event) { … }

public:
  void registerServiceListener() {
    myPC->connectServiceListener(this, “someServiceListener”, “filterExpr”);
  }

private:
  ctkPluginContext* myPC;
};
```

Using ctkServiceFactory

- Allows customized service instances
- The Framework caches service instances

```
struct MyServiceFactory : public ctkServiceFactory {

  QObject* getService(QSharedPointer<ctkPlugin> plugin,
                                   ctkServiceRegistration reg) {
    return new SomeServiceImpl(plugin->getSymbolicName()); }

  void ungetService(QSharedPointer<ctkPlugin> plugin,
                               ctkServiceRegistration reg, QObject* service) {
    delete service; }
};

void A::registerServiceFactory() {
  myServiceFactory = new MyServiceFactory();
  myPC->registerService<SomeService>(myServiceFactory);
}
```

Using ctkServiceTracker

- Convenience class making life easier
- The tracker holds all currently available services

```
class B {

private:
  ctkServiceTracker<SomeService*> myServiceTracker;

public:
  B(ctkPluginContext* context)
    : myServiceTracker(context) { }

  void useSomeService() {
    SomeService* ss = myServiceTracker.getService();
    if (ss) { ... }
  }
};
```

Using Filters

- Service lookups and events can be constrained by the use of filters
- Filters are defined in LDAP query syntax

```
try {
  QList<ctkServiceReference> refs =
      myPC->getServiceReferences<SomeService>
                                        ("(&(myvalue>10)(myvalue<30))");
  foreach(ctkServiceReference sr, refs) {
    ...
  }
}
catch(const std::invalid_argument& e) {
  // filter expression cannot be parsed
}
```

Questions?