



# Module 3

*Development Environment*

The Corda logo, consisting of the word 'corda' in white lowercase letters on a red rectangular background.

**c•rda**



# Overview

This module will explore the Corda Community, available resources, toolchain and walk through running some demos.

## **Learning outcomes:**

- Learn about the Corda toolchain
- Set up development environment and resolve common issues
- Run some sample CorDapps
- Understand what resources are at your disposal



# Repositories

- The Corda code is hosted on Github:

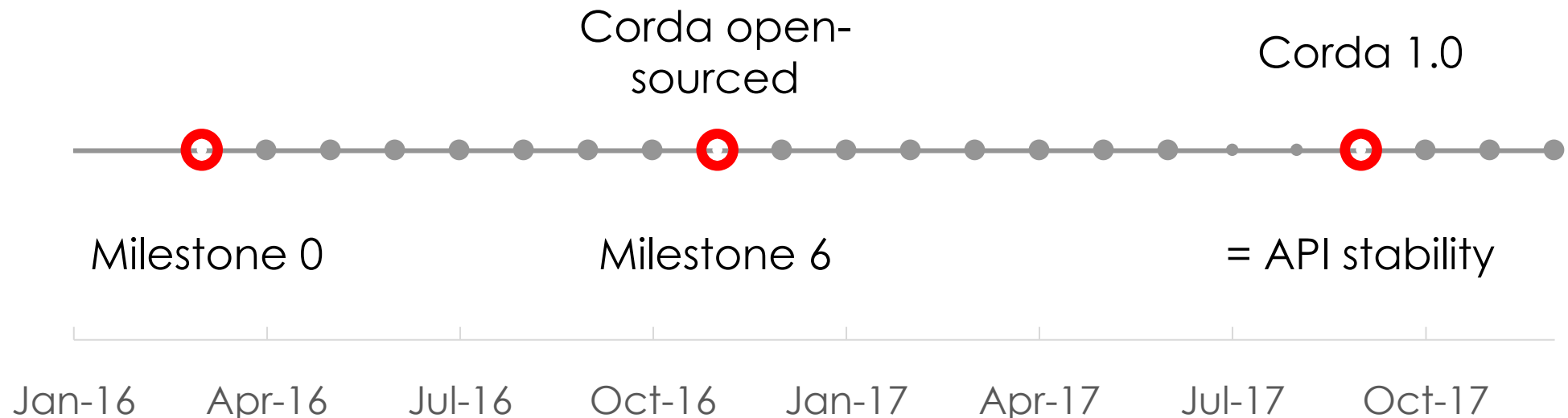
<https://github.com/corda>

- Four key repositories:
  - **corda**: The open-source Corda platform code
  - **cordapp-template (Java or Kotlin)**: A boilerplate CorDapp in both languages to kick-start CorDapp development
  - **cordapp-tutorial**: A simple example CorDapp



# Milestones

- Corda is updated through monthly “Milestone” releases
- R3 operate a time based release process
- Currently on **v1.0**





# Snapshots

- Throughout the month, the R3 platform team merge reviewed pull requests to master
- Building the **HEAD** of master results in a **SNAPSHOT** release
- SNAPSHOTS are numbered one higher than the last milestone
- Therefore, as we are on v1.0, new snapshots are created as

## 1.1-SNAPSHOT

- Snapshots are the **latest version** of the code base
- Snapshots can be unstable!





## Prefer milestones

- Unless you require new the functionality offered by a SNAPSHOT release, **always use the latest MILESTONE release**
- Milestones are thoroughly tested before release
- Although SNAPSHOTS are continuously tested, sometimes mistakes slip through the net

**Always remember to check out the latest MILESTONE before deploying your CorDapps or running the demos.**

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# Choosing a release

- Milestone releases are available as branches in all repos
- Check out a given Milestone using:  
`git checkout release-M[**MILESTONE-NUMBER**]`
- Milestones can also be enumerated with:  
`git tag`
- Corda Milestones are published to Maven, so Corda does not need to be installed to compile CorDapps
- SNAPSHOTS are always on master

# Toolchain

The following is required run/develop CorDapps:

- **JVM** Oracle JDK 8 (latest version ideally – u131 min)
- **IDE** IntelliJ IDEA Community Edition 2017.2.x
- **Source control** Git
- **Build system** Gradle

CorDapps can be written in any JVM language although Corda itself is written in **Kotlin**, which has excellent Java interoperability



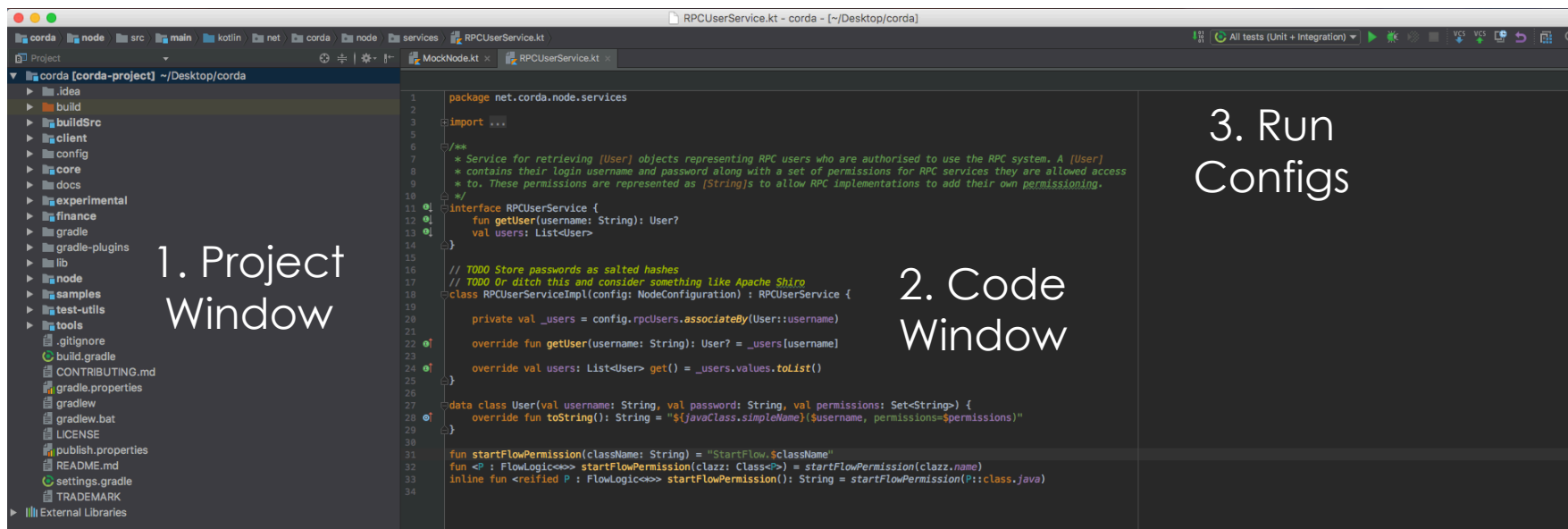
# Getting set up - instructions



<b>Goal</b>	Get your machine set up for Corda development
<b>Steps</b>	<ol style="list-style-type: none"><li>1. Follow the instructions on getting set up: <a href="https://docs.corda.net/getting-set-up.html">https://docs.corda.net/getting-set-up.html</a></li><li>2. Clone the main Corda repo</li><li>3. Check out v1.0 ("release-V1.0")</li><li>4. Open the main Corda repo in IDEA</li><li>5. If you encounter any issues, refer to the Troubleshooting page: <a href="https://docs.corda.net/getting-set-up-fault-finding.html">https://docs.corda.net/getting-set-up-fault-finding.html</a></li></ol>

# IntelliJ IDEA

- The IDE is divided into a project window and a code window
- If the project window is hidden, show it using **⌘1/Alt + 1**
- Demos and debugging can be accessed via “Run Configs” menu



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# Gradle

- Corda and CorDapps are **built using Gradle**
- If there are no folders or modules in the IDEA project window, the **Gradle project must first be imported**
- Instructions on how to do this can be found here:

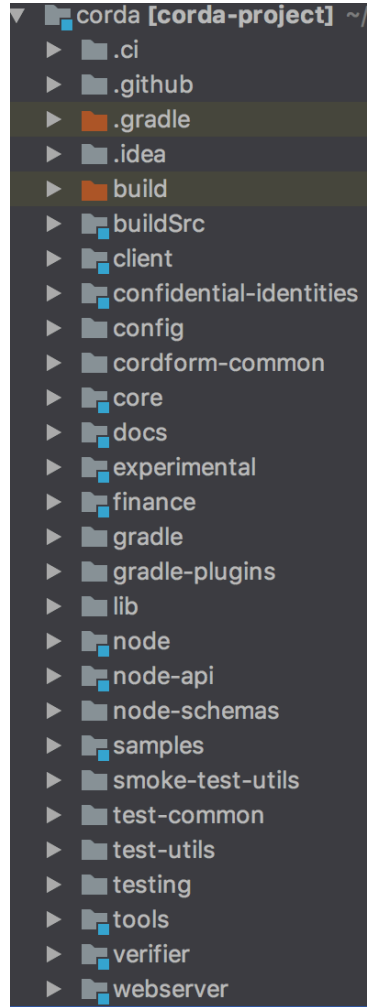
<https://docs.corda.net/getting-set-up-fault-finding.html#no-source-files-are-present>

# Key IDEA shortcuts

IDEA provides some useful shortcuts:

- **Search everywhere (double-press Shift):** Allows you to find the declarations for classes, functions, etc. by name
- **See declaration (Ctrl+B and click/⌘B and click):** Allows you to navigate to the declaration of a class or function to see its fields, methods, params, etc.

# The Corda repository



- Gradle plugins source code
- Security flows (new for v1.0)
- Corda core classes
- The platform documentation (also on docs.corda.net)
- The Gradle plugins used to deploy Corda nodes
- Node implementation internals (non-public APIs)
- Sample CorDapps, demonstrating cash, oracles...
- Testing DSLs and utilities





# Exploring the Corda repo

- There are quite a few modules defined in the main Corda repo!
- We'll now spend a bit of time walking through the content of the main Corda repo and the CorDapp template repo
- There is a lot going on – we can help you focus on the most relevant areas

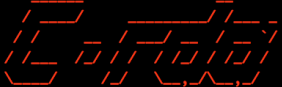
# Running a sample CorDapp - instructions



<b>Goal</b>	Run the Trader demo
<b>Steps</b>	<ol style="list-style-type: none"><li>1. Follow the instructions on running the Trader demo here: <a href="https://docs.corda.net/running-the-demos.html#trader-demo">https://docs.corda.net/running-the-demos.html#trader-demo</a></li><li>2. Run the demo from both IDEA and the command line</li><li>3. If you encounter any issues, refer to the Troubleshooting page: <a href="https://docs.corda.net/getting-set-up-fault-finding.html">https://docs.corda.net/getting-set-up-fault-finding.html</a> or ask us!</li></ol>

# The trader demo - output

```

 It runs on the JVM because QuickBasic
is apparently not 'professional' enough.

--- DEVELOPER SNAPSHOT ---

Logs can be found in           : /Users/joeldudley/Desktop/corda/samples/trader-demo/build/nodes/BankA/logs
Database connection url is     : jdbc:h2:tcp://10.21.0.183:51026/node
Node listening on address      : localhost:10004
Loaded plugins                  : net.corda.traderdemo.plugin.TraderDemoPlugin, net.corda.bank.plugin.BankOfCordaPlugin
Node started up and registered in 59.32 sec

[+] Seller connected, purchasing commercial paper asset
  [x] Waiting for seller trading info
  [x] Verifying seller assets
  [x] Generating and signing transaction proposal
  [x] Swapping signatures with the seller
Done
Purchase complete - we are a happy customer! Final transaction is:

Transaction B6825313026C3A96C861FD8DF8254519E2F9AAA280E6D74DB3C389C2440195B5:
[+] INPUT: 9F8EBED94523D19C923BA6FAE92F60B834FBD0CF933E2B812AACD94134CDD398C(0)
[+] INPUT: 45AA13197C08A7C7828CEF32ED016273FF5269DE4588E209873F38516800E8C0(0)
[+] OUTPUT: TransactionState(data=💰 Cash(1000.00 USD issued by BankOfCorda[01] at BankOfCorda[01] owned by DLApXyGZSUse8zDs4nHSHx8WFeXRBdM913EwxJTKqkag2), notary=corda.notary.validating|Notary, encumbrance=null)
[+] OUTPUT: TransactionState(data=💰 Cash(29000.00 USD issued by BankOfCorda[01] at BankOfCorda[01] owned by DL5nxG8bbuFxDGr8caK7NyKzh9j3YXzbzbA6v1b9VypqX4), notary=corda.notary.validating|Notary, encumbrance=null)
[+] OUTPUT: TransactionState(data=📄 CommercialPaper(of 1100.00 USD issued by Snake Oil Issuer[01] redeemable on 2017-03-09T13:12:44.318Z by 'Bank of London[010203]', owned by DLGe2cZjpouYKkdQevJyEARn9rnwTvggEirnW2EQPhumMp), notary=corda.notary.validating|Notary, encumbrance=null)
[+] COMMAND: Move(contractHash=null) with pubkeys DL5nxG8bbuFxDGr8caK7NyKzh9j3YXzbzbA6v1b9VypqX4
[+] COMMAND: Move(contractHash=null) with pubkeys DLApXyGZSUse8zDs4nHSHx8WFeXRBdM913EwxJTKqkag2

The issuance of the commercial paper came with an attachment. You can find it expanded in this directory:
/Users/joeldudley/Desktop/corda/samples/trader-demo/build/nodes/BankA/attachments/DEC009866689657314870E192CED0C3519C2C9D395507A238338F8D003929DE9.jar

Transaction F4A0AC29FCB2835034BBE4286CC5DCBD7DCDDC0D9B909E185C14FE91B0268B05:
[+] OUTPUT: TransactionState(data=📄 CommercialPaper(of 1100.00 USD issued by Snake Oil Issuer[01] redeemable on 2017-03-09T13:12:44.318Z by 'Bank of London[
[+] Seller connected, purchasing commercial paper asset
  [x] Waiting for seller trading info
  [x] Verifying seller assets
  [x] Generating and signing transaction proposal
  [x] Swapping signatures with the seller
[+] Done

```



# Resources

1. **Documentation (<https://docs.corda.net/>)**
  - Has tutorials (e.g. <https://docs.corda.net/tutorial-contract.html>)
  - API reference (<https://docs.corda.net/api/javadoc/index.html>)
2. **Slack (<https://slack.corda.net/>)**
  - Great for quick questions about design and implementation
  - Our entire dev team hangs out there
3. **Stack Overflow (<https://stackoverflow.com/questions/tagged/corda> )**
  - Replaces “discourse” for technical Q&A
  - Discourse is still used for non-tech discussions
  - Only recently started migrating; not many questions there yet
4. **Corda.net**
  - Key announcements (e.g. Milestone releases)
  - Blog posts on key topics





# Summary

- Corda release process
- Milestones versus Snapshots
- The available repos
- Gradle – build automation
- IntelliJ IDE
- Running a demo