Android lecture 6

Release process

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Application release

Gather materials for release

- Cryptographic keys
  - Apps in store are digitally signed, by developer certificate
  - Identify app developer
  - Self-signed certificate is enough
  - Needs to end after 22 October 2033
  - Protect your private key and password, it is not possible to update application if it is lost
- End-user license agreement (EULA)
  - User should know if you gather some data
  - Not required but recommended
  - GDPR

Gather material for release

- Application icon
  - Visible in launcher, settings or other applications
  - High-res assets for google play store listing
- Misc. materials
  - Promo and marketing materials
  - Promotional text and graphic for store listing
- Changelog

Before release

- Delete unused parts (sources, resources, assets)
- Package name
  - https://play.google.com/store/apps/details?id=com.avast.android.mobilesecurity
- Turn off debug features
  - Delete Log.* calls
  - Remove android:debuggable flag from AndroidManifest
  - Remove Debug or Trace calls
  - If you using WebView ensure that debug is disabled, otherwise is possible to inject js code
- Clean up your directories, checks if libraries doesn’t include some unnecessary files to your *.apk (*.proto, java manifests, …)

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Configure application for release

- Review
  - permissions - remove unnecessary
  - App icon and label
  - Version code and version name
  - Used URLs test vs. production backend
- Check compatibility
  - Support of multiple screens
  - Tablet mode

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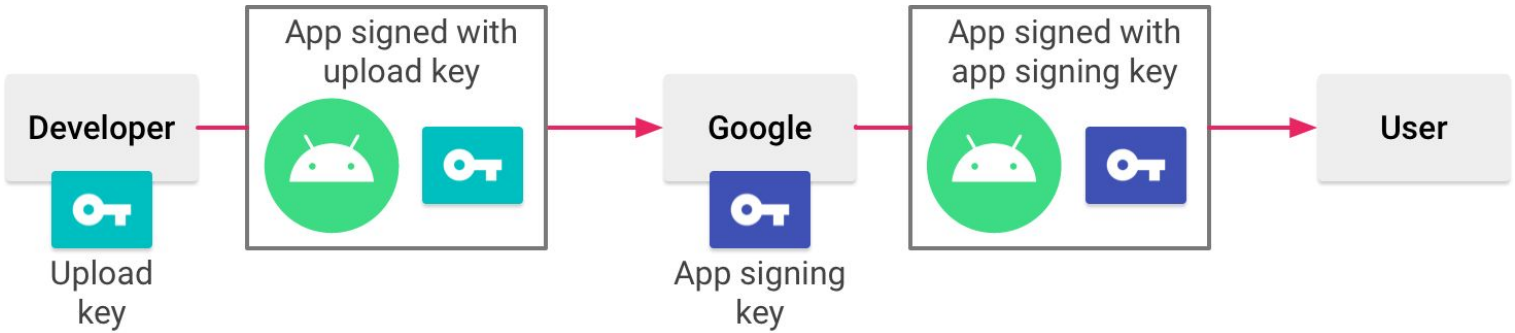
Build application for release

- Signing
  - Manually
    - Using Keytool and Jarsigner from JDK
  - Configure sign options in gradle
  - Android studio
  - Sign scheme v2 https://source.android.com/security/apksigning/v2
  - Sign scheme v3 https://source.android.com/security/apksigning/v3
  - Sign scheme v4 https://source.android.com/security/apksigning/v4
- Obfuscation
  - Use proguard to obfuscate your code, it is really easy to decompile application and find how it works, endpoints
- Consider
  - Who has access to your sign key
  - Signing server

Signing

- Sign vs upload key



https://developer.android.com/studio/publish/app-signing

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Prepare external servers and resources

- Ensure that backend is running
- Check if app is switched to prod environment

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Testing your application for release

- Regression test
- Test new features
- If it is possible test it on multiple devices, android versions
- Test multiple languages, including RTL
- Check lint/detekt for several issues

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Publishing

- Google play store
  - Registration cost 25 USD
  - Reporting about installs
  - Crashes
    - If user sends it
  - Cloud test lab
    - Run monkey tests on multiple devices before releasing
  - Alpha/Beta groups
  - Distribution specific domain - internal apps
  - Staged rollout
  - API - import crash reports to bug tracker, upload new APK, ...

Publishing

- Email, Web page
  - Untrusted sources - security risk
  - Manual Updates
- 3rd party distribution
  - Amazon
  - F-droid

After publish

- Monitor new crashes
- New permission slows down spreading between users on API < 23 (Marshmallow 6.0)
- Not good idea publish app before weekend or vacation

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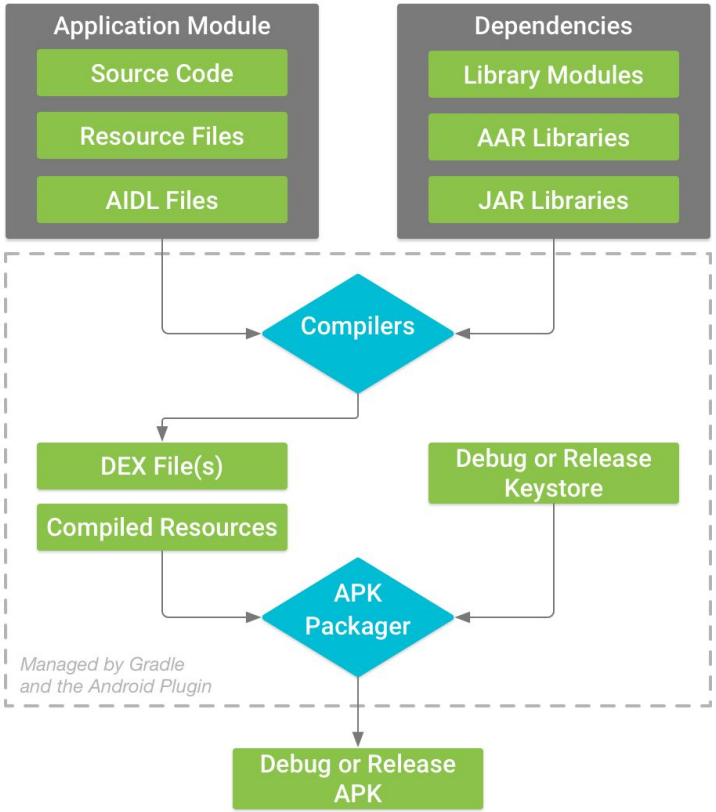
Build process and APK structure

Build process



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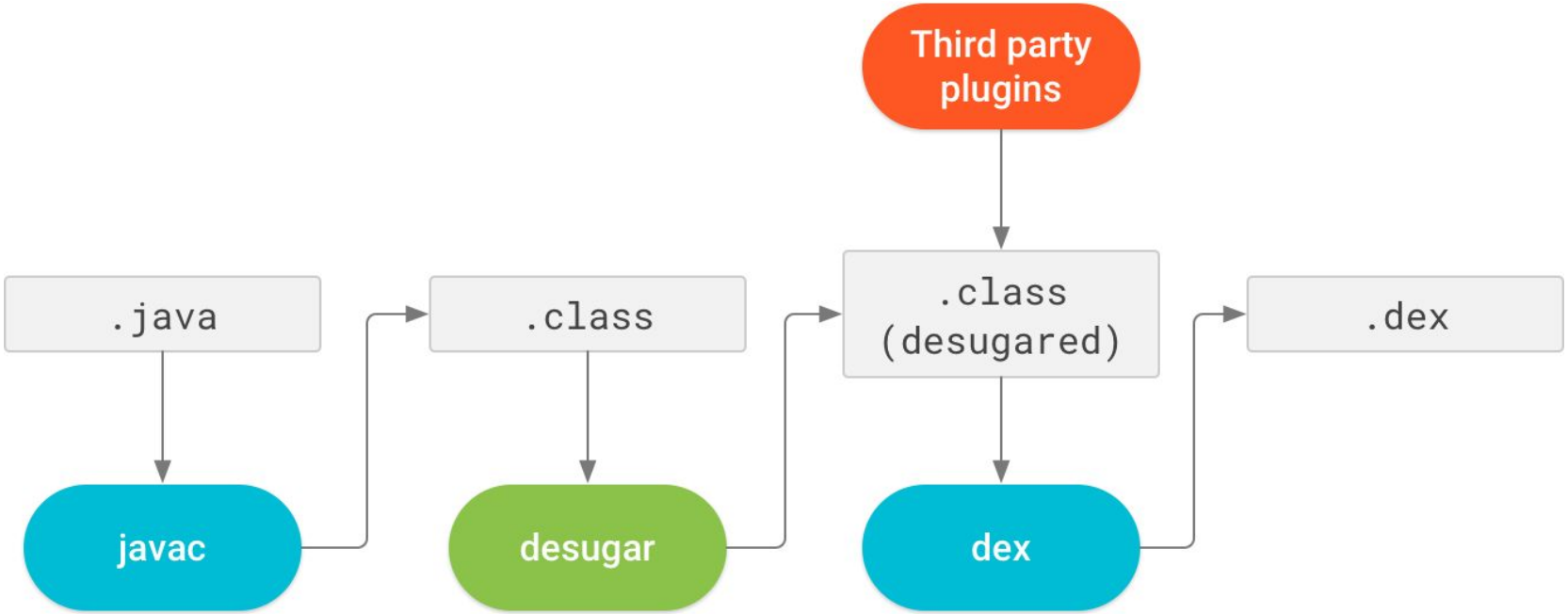
Support java 8 features (d8)



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Building android apps limitations

- Dex limit 64k methods
  - Shrink unused methods and classes (libraries)
    - You need to specify what is entry point, build dependency graph. Classes which are not part of graph are removed, unused methods as well
    - When you work on library, provide proguard rules together with library
  - Sometimes is better copy some classes from library into application
    - for example guava library
- Google doesn’t allow code side load

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Multidex

- Native support since API-21 for older version support library
- Try to avoid using multidex, it slows down application start
- Splits classes to multiple dex files
- on API>=21 dex files are converted to single .oat file (ART runtime)
- Main dex file loaded when app is started
- Loading of additional dex files is performed during initialization
- Dex files are in app folder
- https://www.blackhat.com/docs/ldn-15/materials/london-15-Welton-Abusing-Android-Apps-And-Gaining-Remote-Code-Execution.pdf

Apk structure

```
.
├── AndroidManifest.xml- binary XML form of Android manifest
├── classes.dex      - classes compiled to dex
├── META-INF
│   ├── CERT.RSA       - Application certificate
│   ├── CERT.SF        - SHA-1 digest of corresponding lines in the MANIFEST.mf
│   └── MANIFEST.MF    - Manifest file list of files with their SHA-1 hash
├── assets             - assets files
├── res                   - resources
│   ├── drawable-hdpi-v4
│   ├── drawable-mdpi-v4
│   ├── drawable-xhdpi-v4
│   ├── drawable-xxhdpi-v4
│   ├── drawable-xxxhdpi-v4
│   ├── layout
│   ├── menu
│   └── xml
└── resources.arsc        - resources compiled to binary form
```

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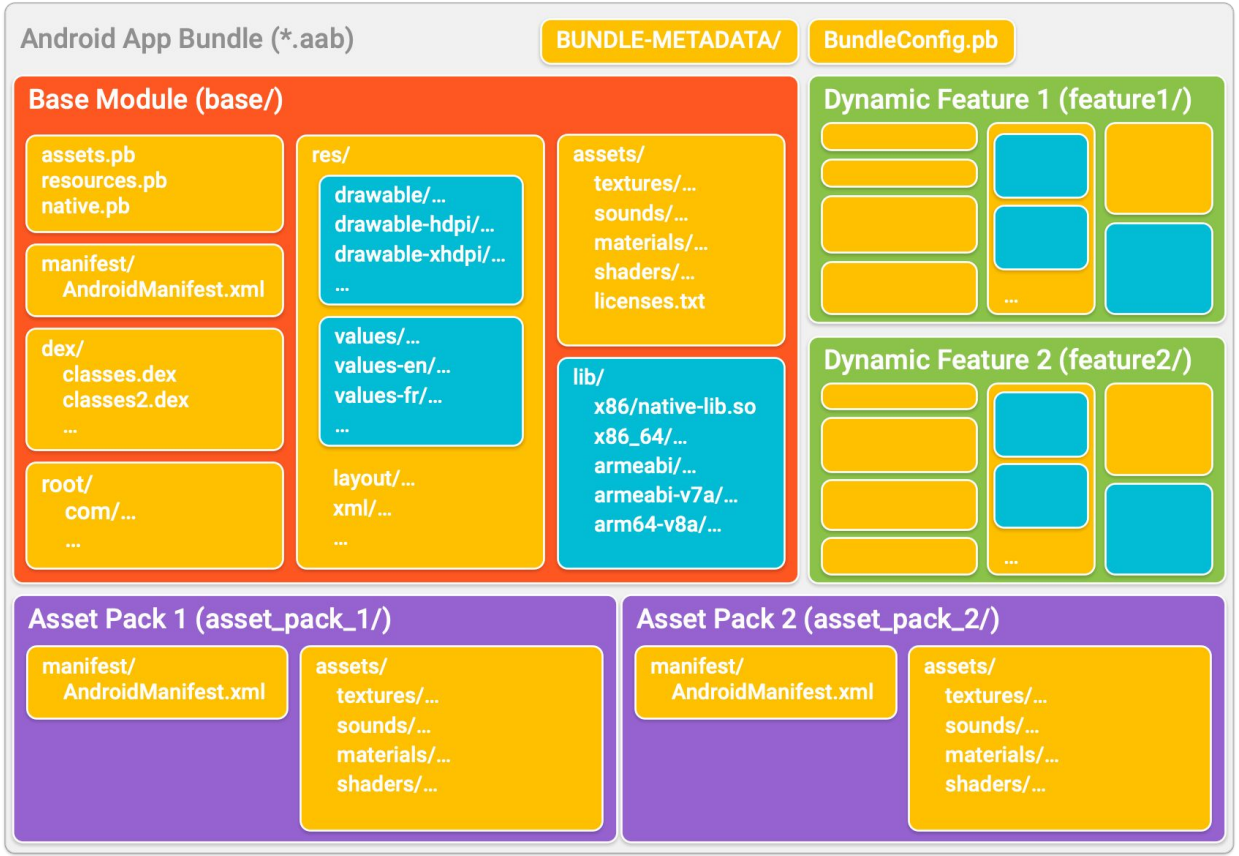
AppBundle



https://developer.android.com/guide/app-bundle

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Proguard/R8

- Shrink - smaller code, faster build
- Optimize - faster code, removing static conditions
- Obfuscate - make it harder to read

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Decompile apk

- Unzip the apk
- Dex2Jar to convert classes.dex to jar archive
  - https://github.com/pxb1988/dex2jar
- jd-gui to view decompiled classes
  - http://jd.benow.ca/
- BytecodeViewer
  - https://bytecodeviewer.com/
- Android studio apk analyzer
  - Easy to check resources
  - Compare multiple apk

Android and SW development - best practices

- Keep strings, dimensions, colors, … in resources
- Create libs for parts used in multiple projects (simplify maintenance, speed-up builds)
- Use git
- Do code reviews
- Write tests

Thank you
Q&A

Feedback is appreciated

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Please use [mff-android] in subject