
Google
Developers

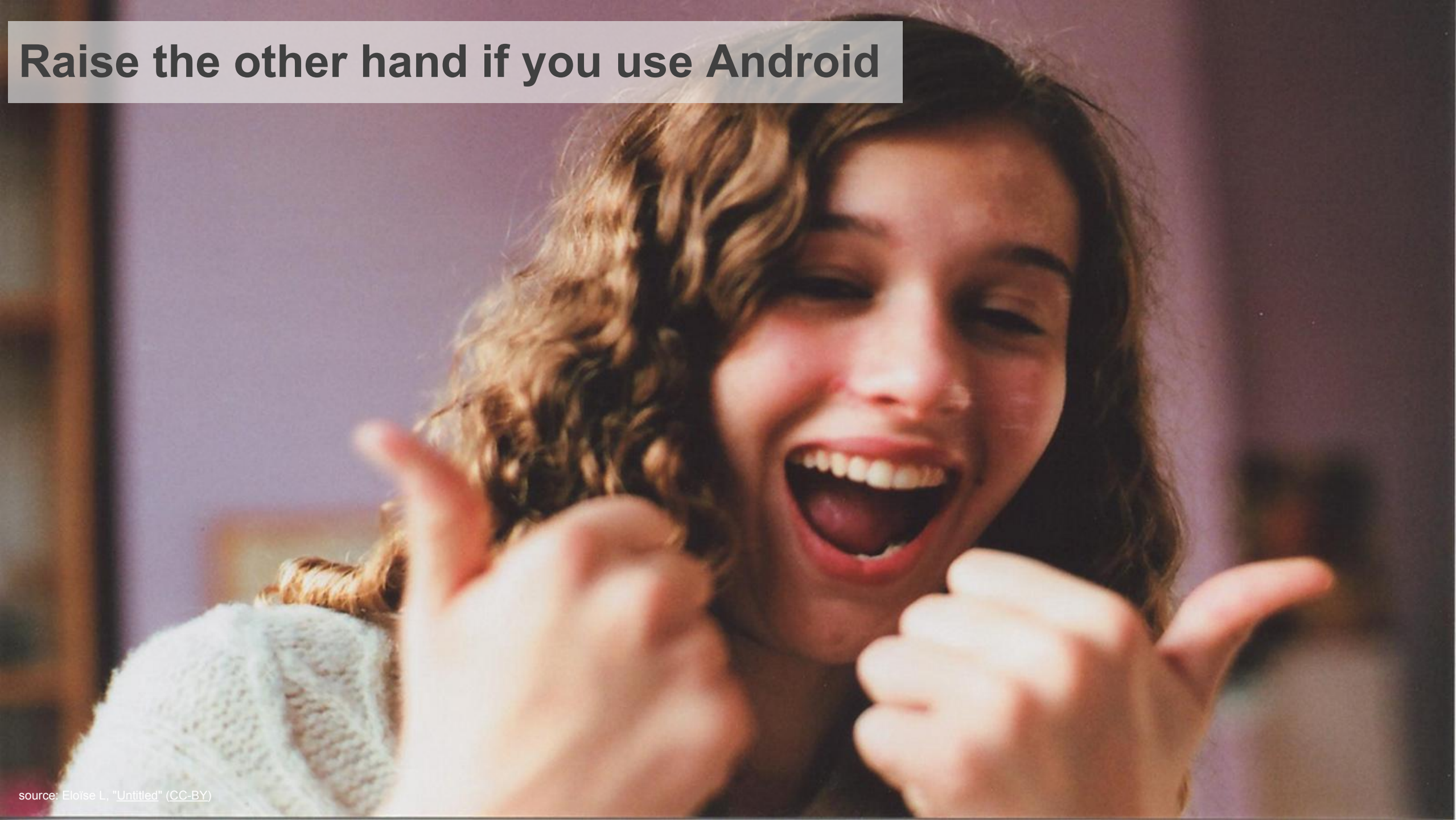
Writing Efficient Drive Apps for Android

Claudio Cherubino / Alain Vongsouvanh
Google Drive Developer Relations

Raise your hand if you use Google Drive

source: "put your hands up!" (CC-BY)

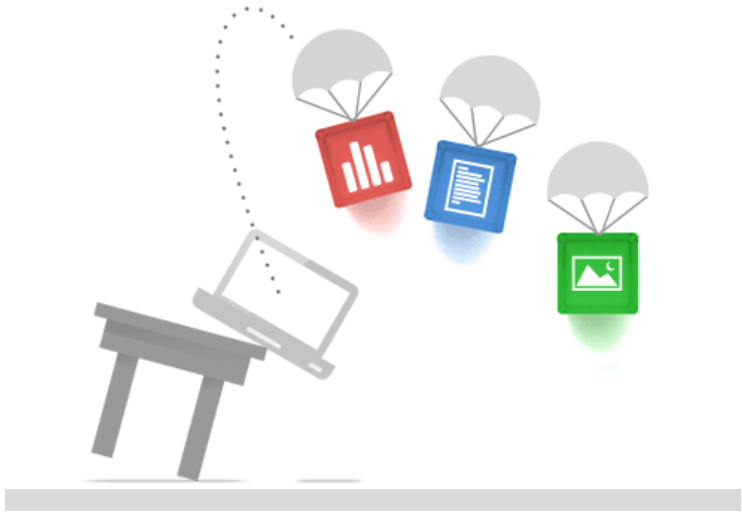
Raise the other hand if you use Android



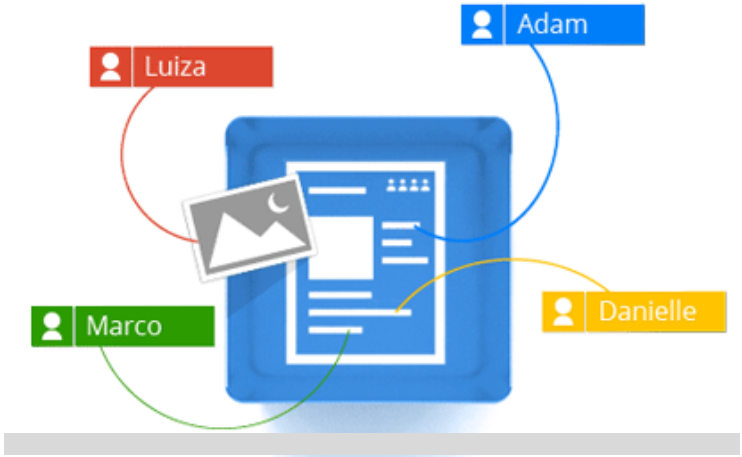
source: Eloïse L, "Untitled" (CC-BY)

Google Drive

Access everywhere

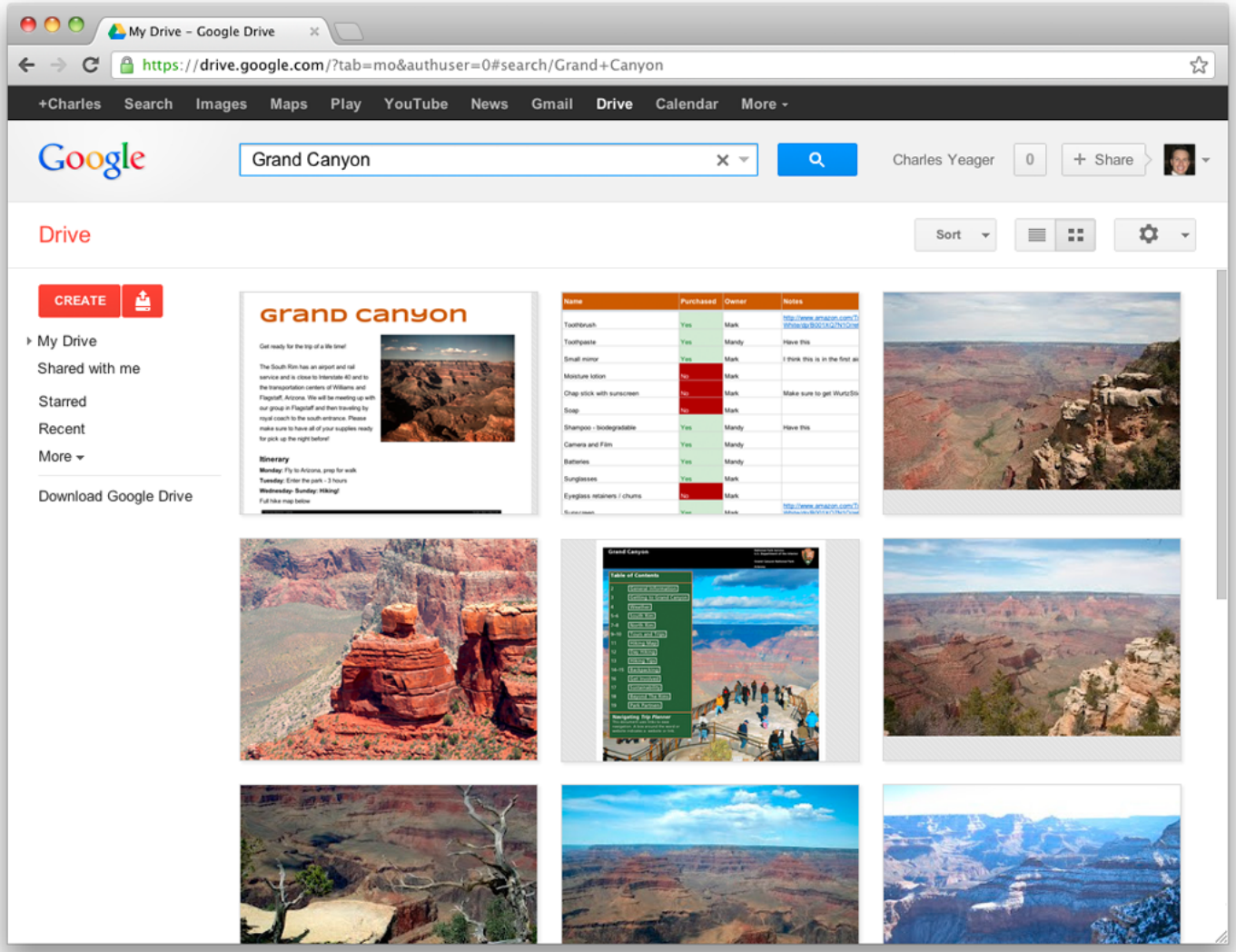


Store files in a safe place

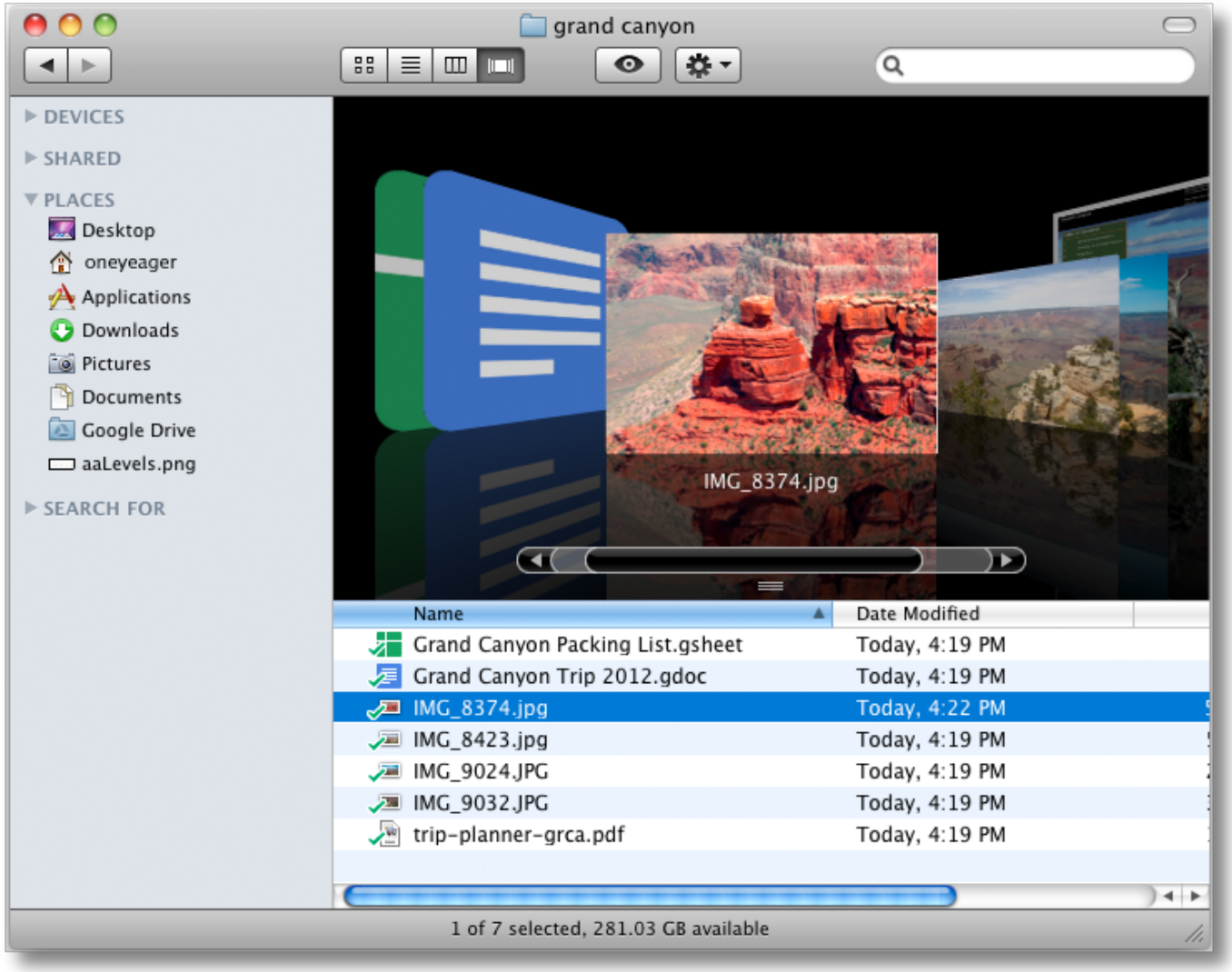


Go beyond storage. Collaborate.

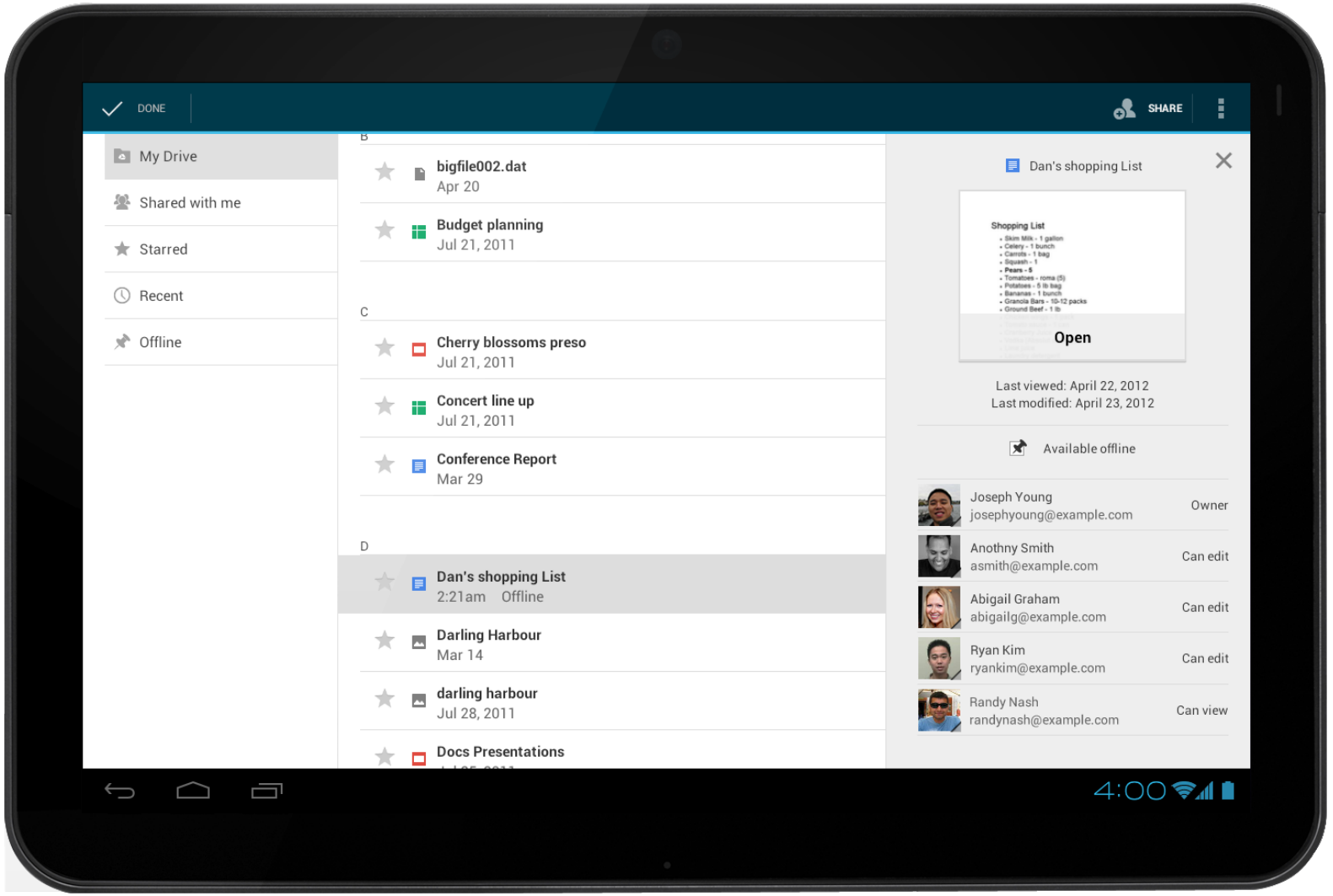
Google Drive in your browser



Google Drive on your desktop



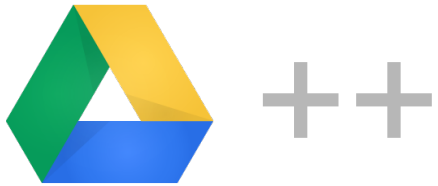
Google Drive on Android



Drive SDK opportunity

Extensive Reach

Put your app in front of millions of users with billions of files



Effortless Integration

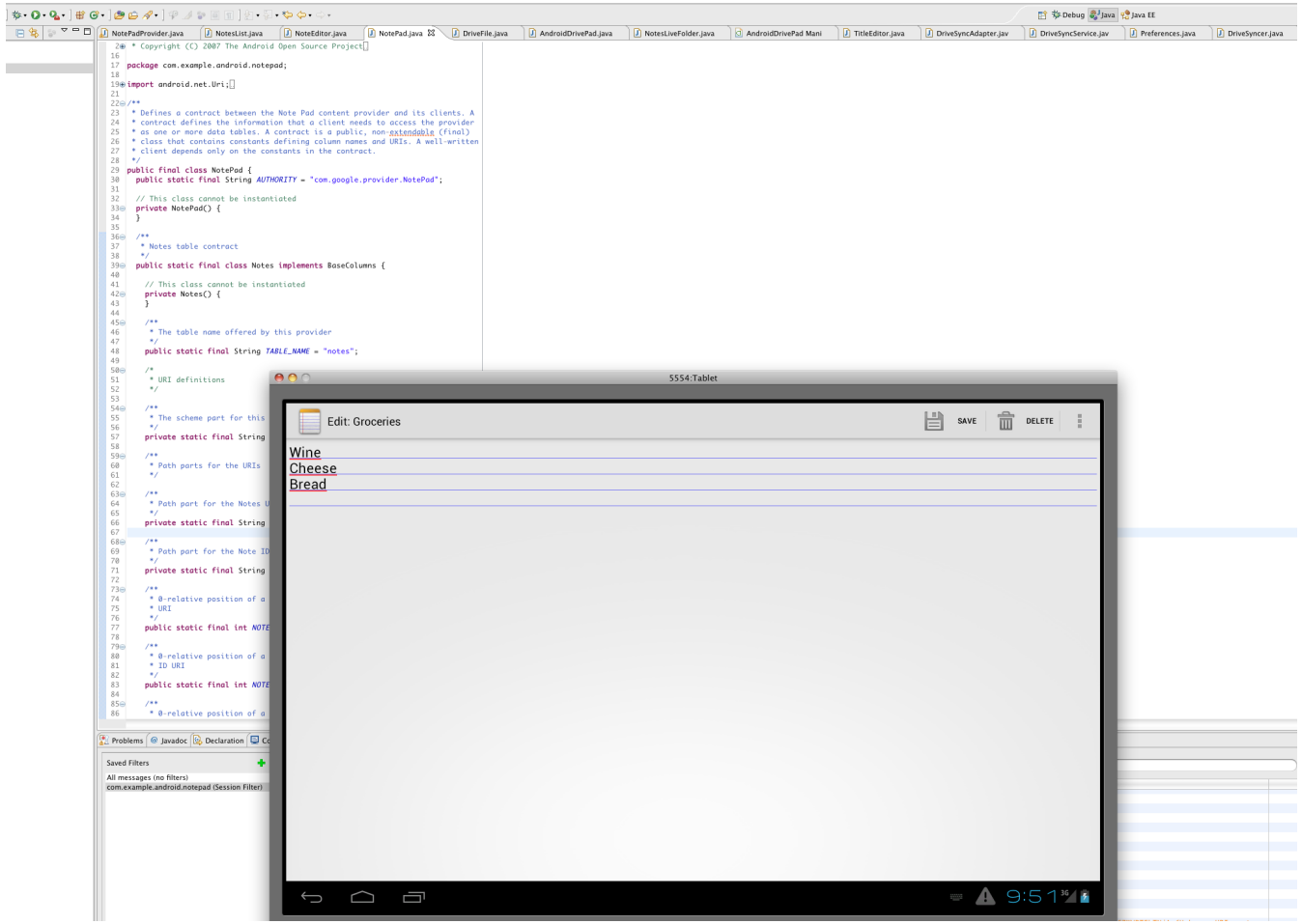
Get the best of Google Drive's sharing capabilities, storage capacity and user identity management so you can focus on your app

Drive Apps

Open files and docs with your app directly from Drive.
Full integration - search, sharing and revisions

Android Notepad

- Simple notepad application
- Uses SQLite to store notes on the device
- The app you write right after Hello World!
- Perfect starting point for our app



Integrate Notepad with Google Drive

- Perform Authorization
- Unblock the UI thread
- Write a Drive Sync Adapter
- Interact with the Drive app for Android
- Optimize Efficiency

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Authorization in Android: Getting an account

JAVA

```
import com.google.android.gms.common.AccountPicker;
// ...
class MyActivity extends Activity {
  private static final int CHOOSE_ACCOUNT = 0;
  // ...
  private void chooseAccount(Account savedAccount) {
    startActivityForResult(AccountPicker.newChooseAccountIntent(savedAccount, null,
        new String[]() {"com.google"}, false, null, null, null, null),
        CHOOSE_ACCOUNT);
  }
  // ...
}
```

Authorization in Android: Getting an account

JAVA

```
import com.google.android.gms.common.AccountPicker;
// ...
class MyActivity extends Activity {
  private static final int CHOOSE_ACCOUNT = 0;
  // ...
  protected void onActivityResult(int requestCode, int resultCode, Intent data) {
    if (requestCode == CHOOSE_ACCOUNT && resultCode == RESULT_OK && data != null) {
      String accountName = data.getStringExtra(AccountManager.KEY_ACCOUNT_NAME);
      // TODO: Do something with the account.
    }
  }
  // ...
}
```

Authorization in Android: Getting an account

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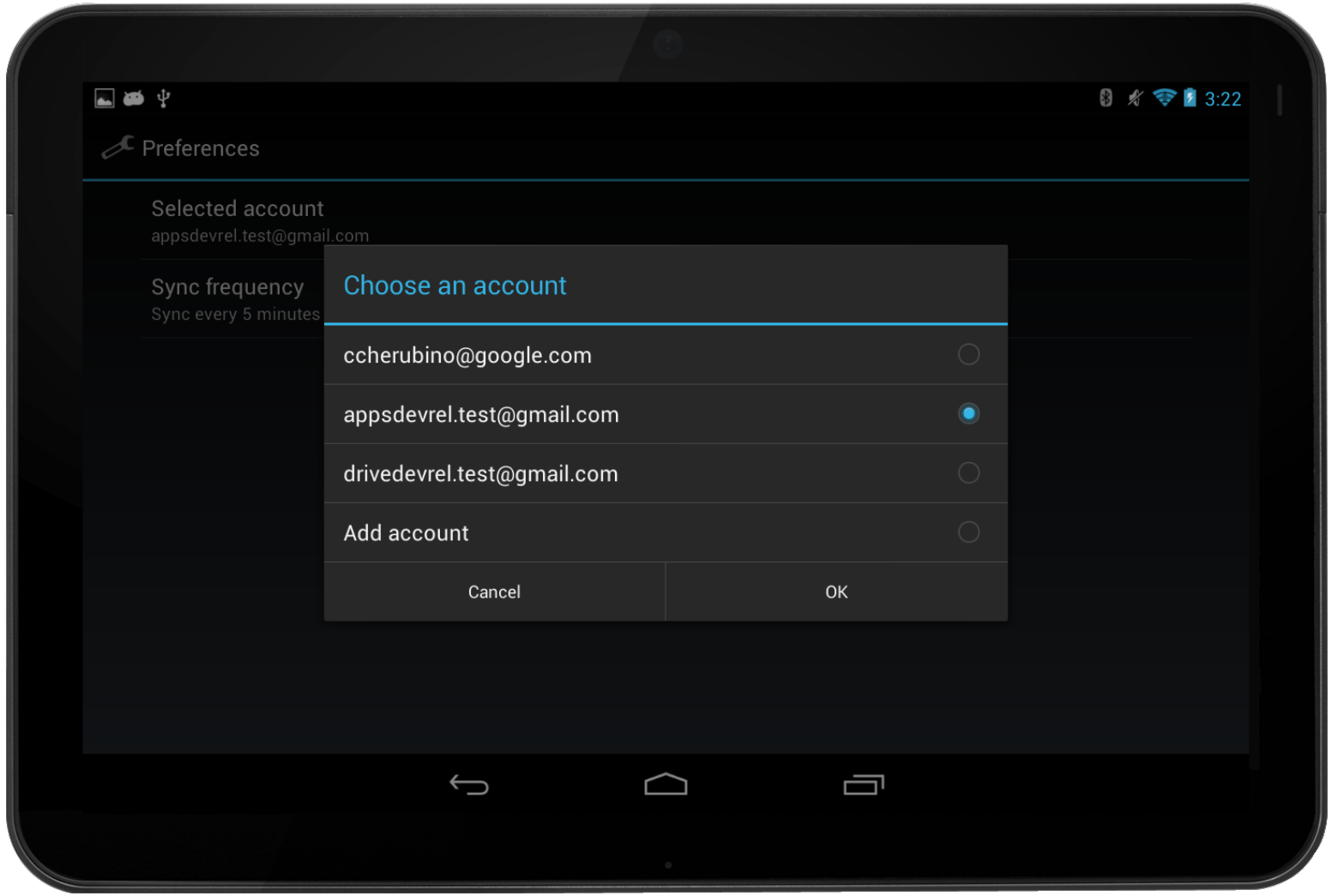
Authorization in Android: Getting an account



Authorization in Android: Getting an access token

JAVA

```
// Must run outside of the UI thread.
private String getAccessToken(Context context, Account account) {
  try {
    return GoogleAuthUtil.getToken(context, account.name, "oauth2:" + DriveScopes.DRIVE_FILE);
  } catch (UserRecoverableAuthException e) {
    // Start the Approval Screen Intent, if not run from an Activity, add the Intent.FLAG_ACTIVITY_NEW_TASK flag.
    context.startActivityForResult(e.getIntent());
  }
  return null;
}
```

Authorization in Android: Getting an access token

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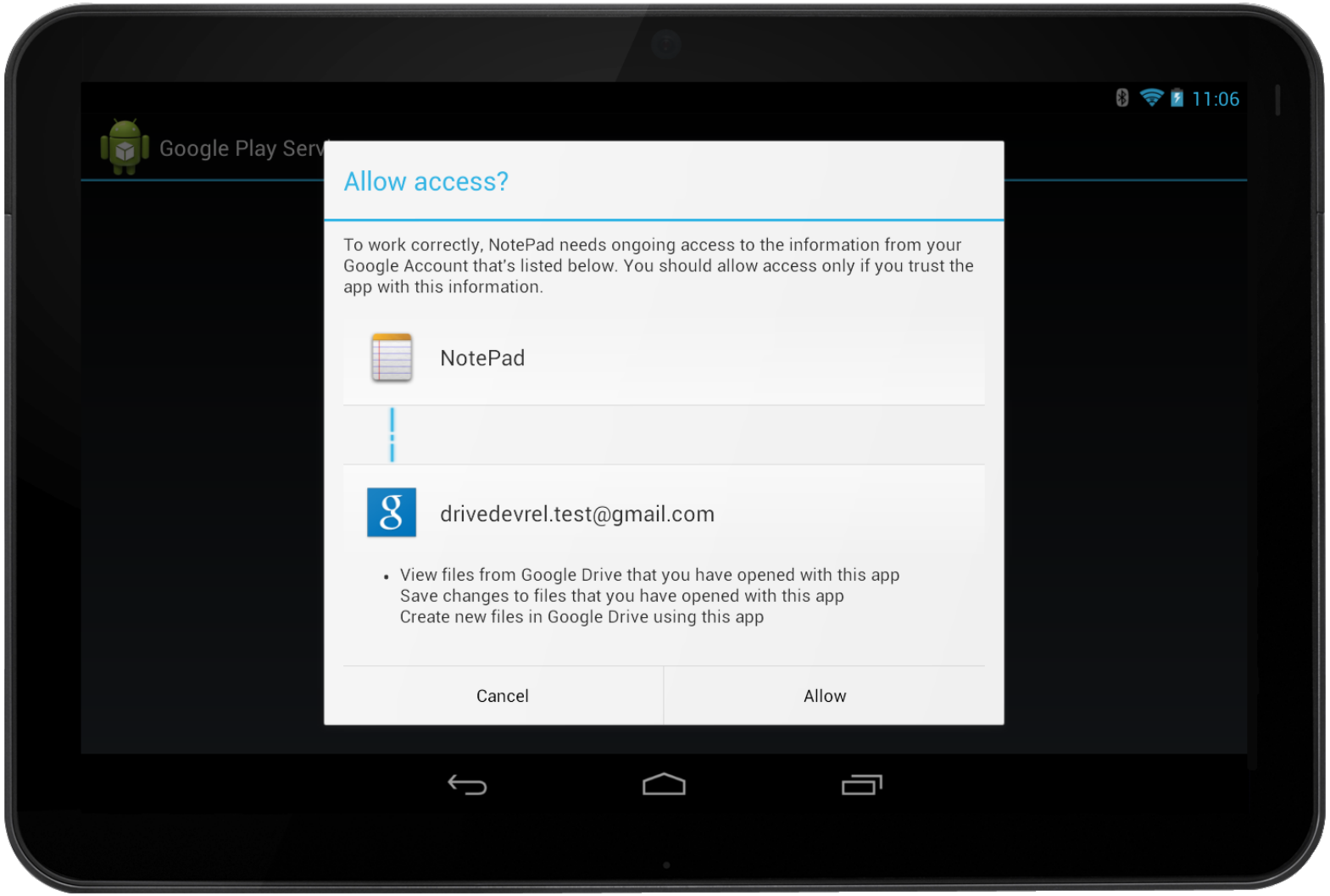
Authorization in Android: Getting an access token



Authorization in Android: Additional Information

If you want to know more about Authorization in Android, please attend the "Building Android Applications that Use Web APIs" session (http://goo.gl/rsdh2)

- Register your Android app on the APIs Console
- Full implementation of the GoogleAuthUtil.getToken call in an AsyncTask
- Catch errors from AccountPicker and the Authorization Grant Screen
- Catch expired or invalid tokens

Integrate Notepad with Google Drive

- Perform Authorization
- Unblock the UI thread
- Write a Drive Sync Adapter
- Interact with the Drive app for Android
- Optimize Efficiency

From synchronous...

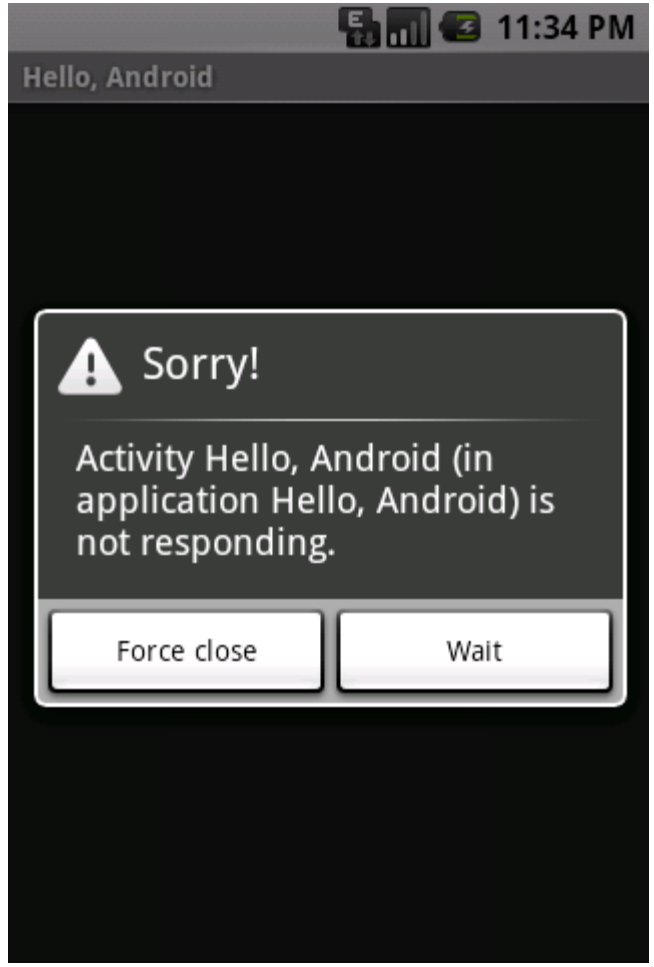
source: Alessandro Bonvini, "14.23: In fila per un gelato" (CC-BY)

...to asynchronous

source: William Warby, "Heat 1 of the Womens 100m Hurdles Semi-Final" (CC-BY)

Unblock the UI thread

- If the UI thread freezes the user is presented with the "application not responding" (ANR) dialog
- Always run long-running operations in worker threads
- Provide a Handler for child threads to post back to upon completion
- Fortunately, SyncAdapters do all the heavy lifting!



Integrate Notepad with Google Drive

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Drive sync adapter

3 components are involved:

1. Data is stored in the local database by a **ContentProvider**
2. A **SyncAdapter Service** runs in the background and periodically synchronizes data with the cloud
3. An **AbstractThreadedSyncAdapter** implementation contains the sync logic

You may optionally add a settings page to allow users to configure the sync frequency

Drive sync adapter: DriveSyncService

Java

```
public class DriveSyncService extends Service {
  @Override
  public void onCreate() {
    // Instantiate a new static DriveSyncAdapter.
  }

  @Override
  public IBinder onBind(Intent intent) {
    // Return the DriveSyncAdapter instance's Sync Adapter Binder.
  }
}
```

Drive sync adapter: DriveSyncService

Java

```
//...
  private static final Object sSyncAdapterLock = new Object();
  private static DriveSyncAdapter sSyncAdapter = null;
  @Override
  public void onCreate() {
    synchronized (sSyncAdapterLock) {
      if (sSyncAdapter == null) {
        sSyncAdapter = new DriveSyncAdapter(getApplicationContext(), true);
      }
    }
  }
//...
```

Drive sync adapter: DriveSyncService

Java

```
//...
  private static DriveSyncAdapter sSyncAdapter = null;
  @Override
  public IBinder onBind(Intent intent) {
    return sSyncAdapter.getSyncAdapterBinder();
  }
//...
```

Drive sync adapter: Service manifest

XML

```xml
<service android:name="DriveSyncService">
    <intent-filter>
        <action android:name="android.content.SyncAdapter" />
    </intent-filter>
    <meta-data
        android:name="android.content.SyncAdapter"
        android:resource="@xml/syncadapter" />
</service>
```

Drive sync adapter: XML resource

XML

```
<?xml version="1.0" encoding="utf-8"?>
<sync-adapter xmlns:android="http://schemas.android.com/apk/res/android"
        android:contentAuthority="com.google.provider.NotePad"
        android:accountType="com.google"
        android:userVisible="true"
        android:supportsUploading="true" />
```

Drive sync adapter: DriveSyncAdapter

Java

```
public class DriveSyncAdapter extends AbstractThreadedSyncAdapter {
  public DriveSyncAdapter(Context context, boolean autoInitialize) {
    super(context, autoInitialize);
  }

  @Override
  public void onPerformSync(Account account, Bundle bundle, String authority,
      ContentProviderClient provider, SyncResult syncResult) {
    // Perform sync logic.
  }
}
```

Drive sync adapter: Enable it!

JAVA

```
private static final String AUTHORITY = "com.google.provider.NotePad";

private void setSyncFrequency(Account account, long syncFrequency) {
  ContentResolver.setSyncAutomatically(account, AUTHORITY, true);
  ContentResolver.addPeriodicSync(account, AUTHORITY, new Bundle(), syncFrequency);
  }
}
```

Drive sync adapter

Let's talk to Drive!

- Retrieve files from the user's Google Drive
- Create new local file
- Sync local files with remote changes
- Handle deleted files

Retrieve files from Drive

JAVA

```
private void storeAllDriveFiles(Drive service) {
  Files.List request = service.files().list().setQ("mimeType=text/plain");
  do {
    FileList files = request.execute();
    for (File file : files.getItems()) {
      String fileId = file.getId();
      String title = file.getTitle();
      InputStream content = service.getRequestFactory().buildGetRequest(file.getDownloadUrl()).execute().getContent();
      insertDriveFile(fileId, title, content);
    }
    request.setPageToken(files.getNextPageToken());
  } while (request.getPageToken() != null && request.getPageToken().length() > 0);
}
```

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}
```

Save files to Drive

JAVA

```
private void insertLocalFile(Drive service, ContentClientProvider provider, Cursor cursor, Uri noteUri) {
  File newFile = new File();
  newFile.setTitle(cursor.getString(COLUMN_INDEX_TITLE));
  newFile.setMimeType("text/plain");
  String content = cursor.getString(COLUMN_INDEX_NOTE);
  File insertedFile = service.files().insert(
      newFile, ByteArrayContent.fromString("text/plain", content)).execute();
  ContentValues values = new ContentValues();
  values.put(COLUMN_NAME_DRIVE_ID, insertedFile.getId());
  values.put(COLUMN_NAME_MODIFICATION_DATE, insertedFile.getModifiedByMeDate().getValue();
  values.put(COLUMN_NAME_CREATED_DATE, insertedFile.getCreatedDate().getValue());
  provider.update(noteUri, values, null, null);
}
```

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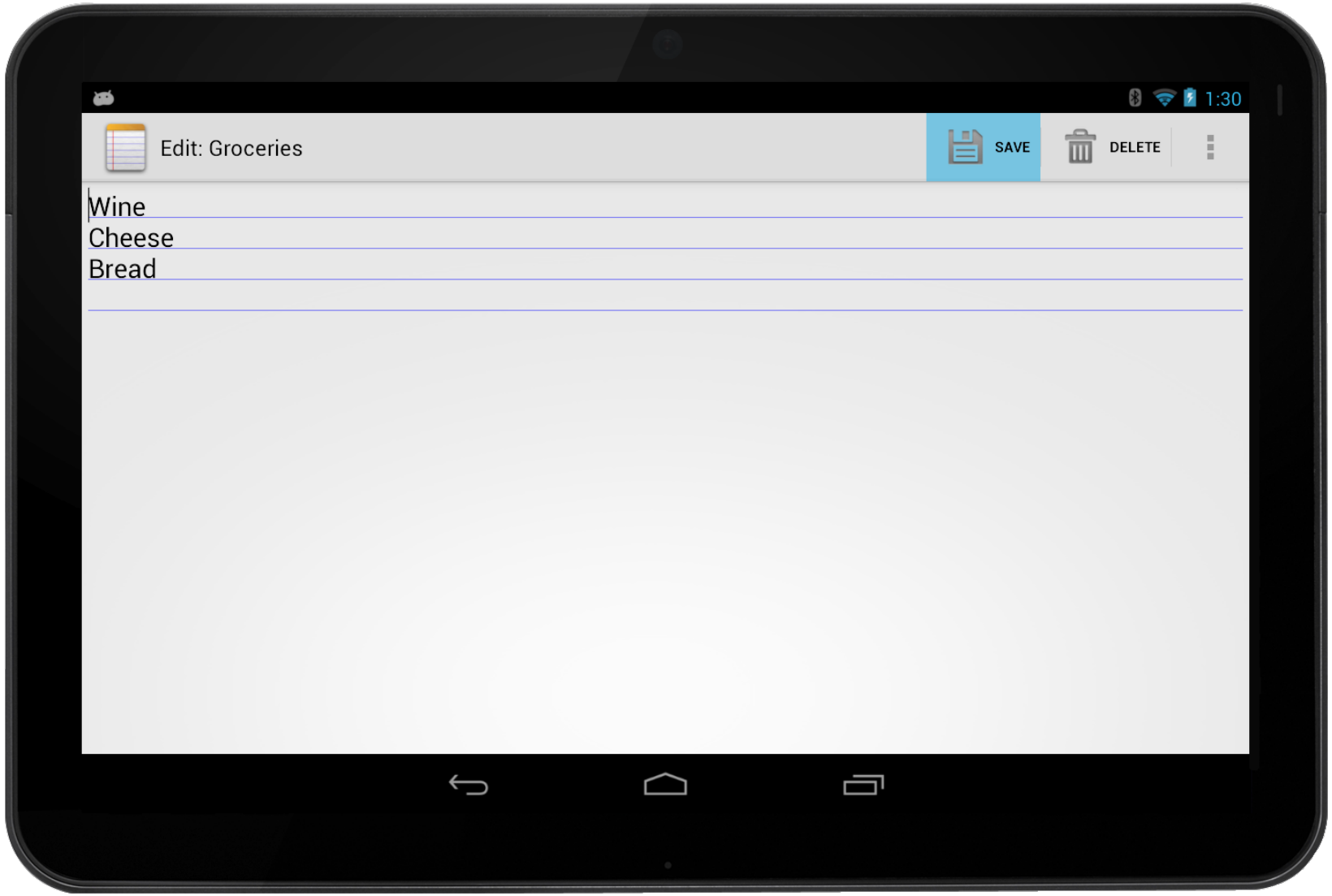
Save files to Drive



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Receiving intents from the Drive app

- Export an Activity that supports an intent with the following info:
  - action: drive.intent.action.DRIVE_OPEN
  - path: content://com.google.android.drive/open/***resourceId***
  - type: MIME type of the file

- Declare your API Project ID in the Activity's metadata

- List supported MIME types in the intent-filter element

- The intent will not include the body of the document nor the user account

- Retrieve the file from the Drive API using the resourceId provided by the intent in the path

Receiving intents from the Drive app

XML

```
<manifest …>
  <uses-permission android:name="android.permission.GET_ACCOUNTS" />
  <application …>
    <activity android:name="DriveActivity"  android:label="@string/cloud_paint" android:icon="@drawable/app_icon" android:exported="true">
      <meta-data android:name="com.google.android.apps.drive.APP_ID" android:value="id=1234567890" />
      <intent-filter>
        <action android:name="com.google.android.apps.drive.DRIVE_OPEN" />
        <data android:mimeType="text/plain" />
        <data android:mimeType="text/html" />
      </intent-filter>
    </activity>
  </application>
</manifest>
```

Receiving intents from the Drive app

JAVA

```
@Override
protected void onCreate(Bundle savedInstanceState) {
  super.onCreate(savedInstanceState);
  final Intent intent = getIntent();
  final String action = intent.getAction();
  if ("drive.intent.action.DRIVE_OPEN".equals(action)) {
    String fileId = intent.getStringExtra("resourceId");
    // Prompt the user to choose the account to use and process the file using the Drive API.
  } else {
    // Other action.
  }
}
```

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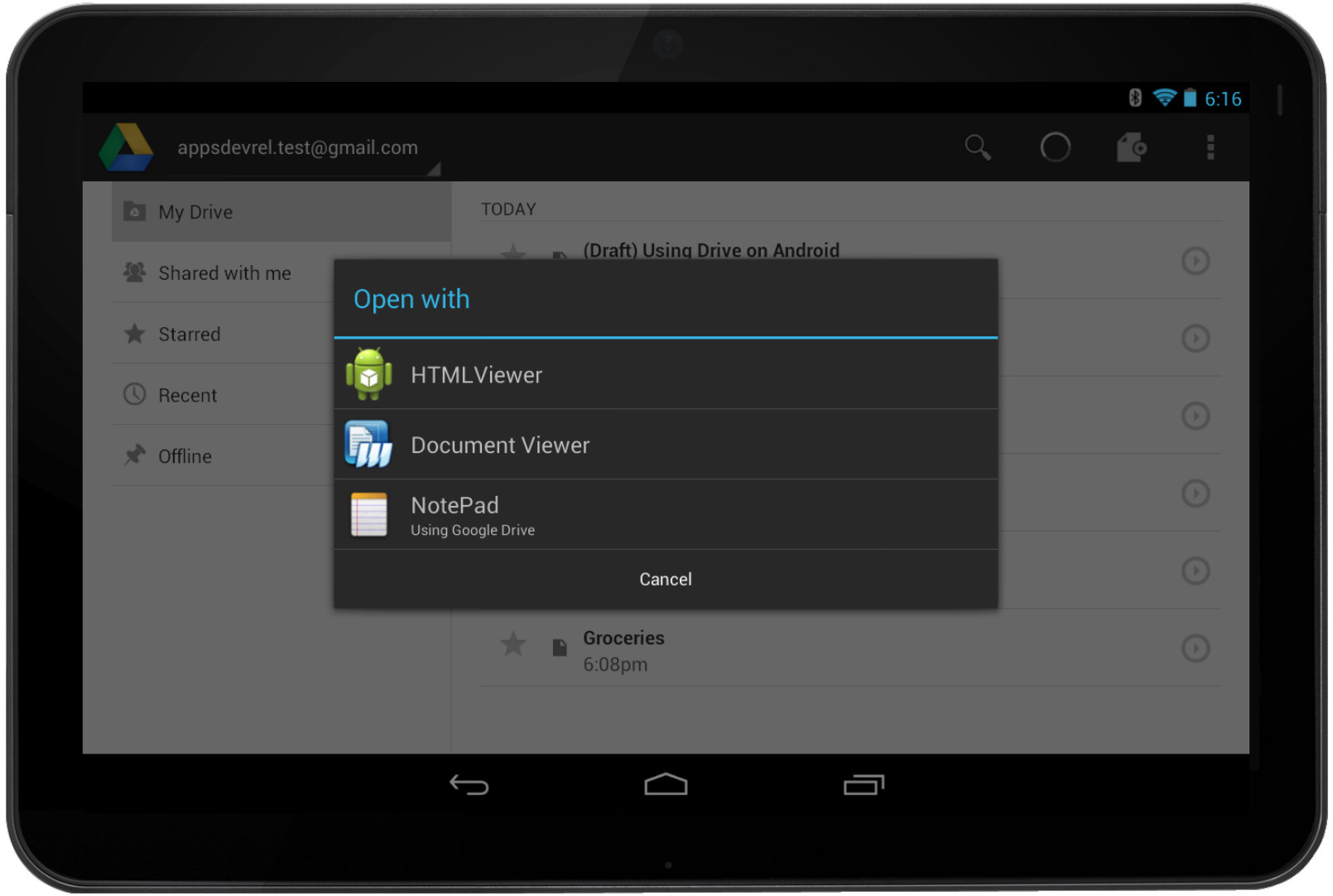

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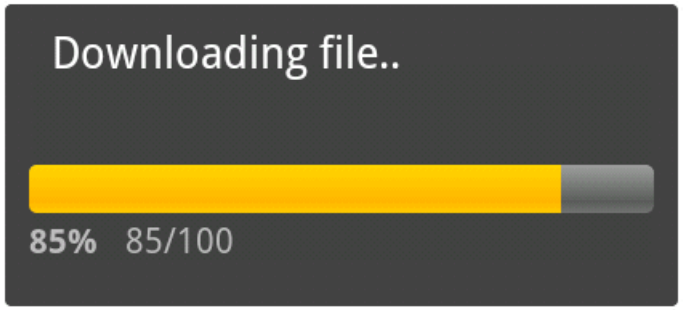
Every byte is sacred

- Drive files can be up to 10GB
- Even with the fastest available 4G, it takes 20+ hours to download a 10GB file!
- Only download files from Drive when it is absolutely necessary
- Use the local database as cache
- When the user requests a file
  - send a request to get its metadata
  - compare the md5Checksum field in the metadata with the one in the local database (if present)
  - return the local copy if they match or download the document from Drive when they don't



source: http://www.theverge.com/2012/4/18/2956899/4g-3g-speed-test-att-verizon-tmobile-sprint-fastest-carrier

Using Drive file metadata

JAVA

```
private void pushChangeToDrive(Drive service, Cursor localFile, File driveFile) {
  String localNote = localFile.getString(COLUMN_INDEX_NOTE);
  File updatedFile = null;
  driveFile.setTitle(localFile.getString(COLUMN_INDEX_TITLE));
  if (md5Checksum(localNote).equals(driveFile.getMd5Checksum())) {
    updatedFile = service.files().update(driveFile.getId(), driveFile).execute(); // Only update the metadata.
  } else {
    // Update both content and metadata.
    ByteArrayContent content = ByteArrayContent.fromString("text/plain", localNote);
    updatedFile = service.files().update(driveFile.getId(), driveFile, content).execute();
  }
  // Update local files metadata.
}
```

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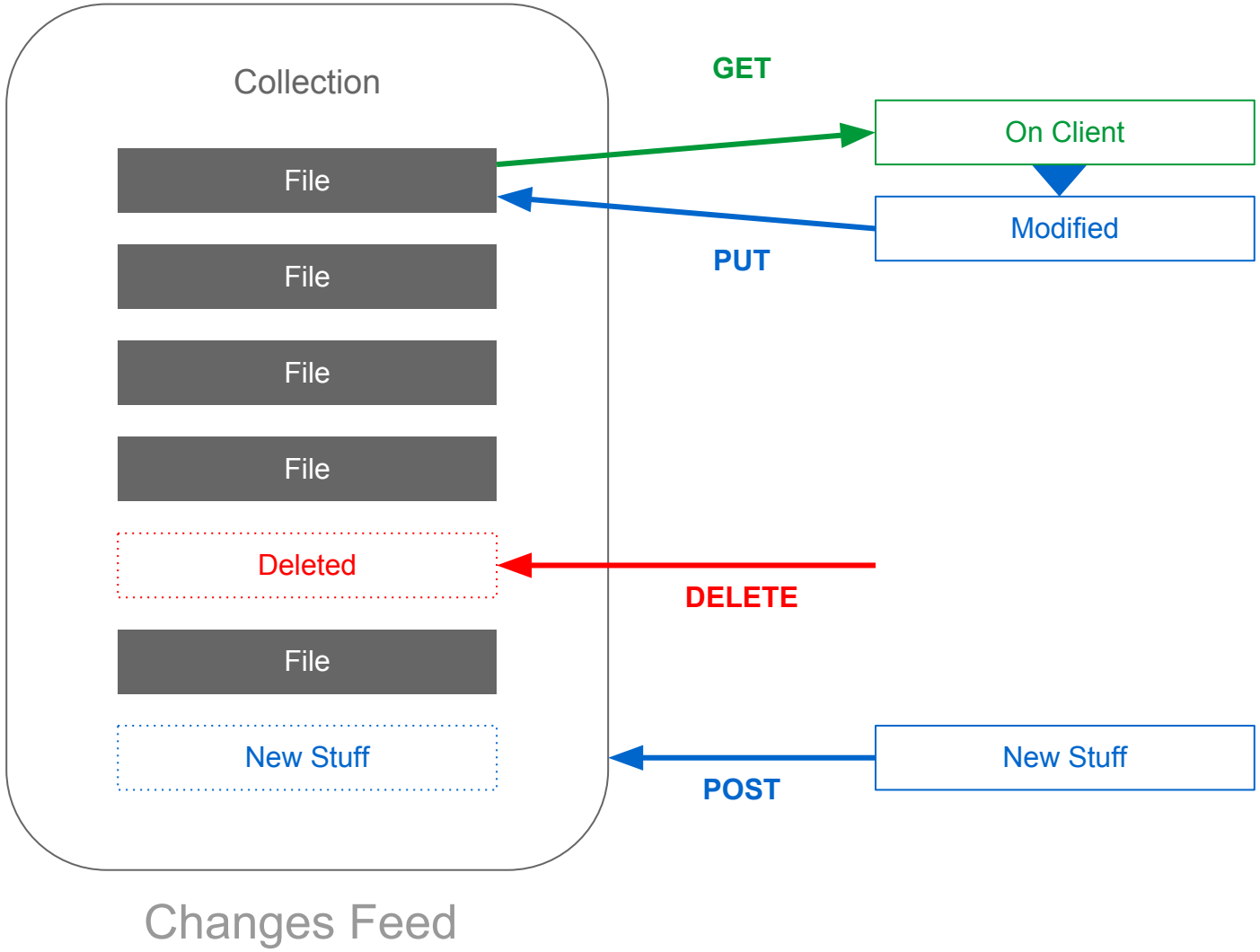
Detecting changes to files



Detecting changes to files

JAVA

```
Changes.List request =
    service.changes().list().setStartChangeId(new BigInteger(Long.toString(startChangeId)));
do {
  ChangeList changes = request.execute();
  for (Change change : changes.getItems()) {
    if (change.getDeleted()) {
      // File with ID "change.getFileId()" has been deleted.
    } else {
      File changedFile = change.getFile(); // Do something with the updated metadata.
    }
  }
  request.setPageToken(changes.getNextPageToken());
} while (request.getPageToken() != null && request.getPageToken().length() > 0);
```

Detecting changes to files

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    }
  }
  request.setPageToken(changes.getNextPageToken());
} while (request.getPageToken() != null && request.getPageToken().length() > 0);
```

Detecting changes to files

JAVA

```
Changes.List request =
    service.changes().list().setStartChangeId(new BigInteger(Long.toString(startChangeId)));
do {
  ChangeList changes = request.execute();
  for (Change change : changes.getItems()) {
    if (change.getDeleted()) {
      // File with ID "change.getFileId()" has been deleted.
    } else {
      File changedFile = change.getFile(); // Do something with the updated metadata.
    }
  }
  request.setPageToken(changes.getNextPageToken());
} while (request.getPageToken() != null && request.getPageToken().length() > 0);
```

Live demo

<Thank You!>

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