



Google
Developers



Building Glassware

with the Google Mirror API

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Menu

- Guidelines
- The Mirror API
- Example Glassware





Guidelines

Making awesome Glassware

- Design for Glass
- Don't get in the way
- Keep it timely
- Avoid the unexpected

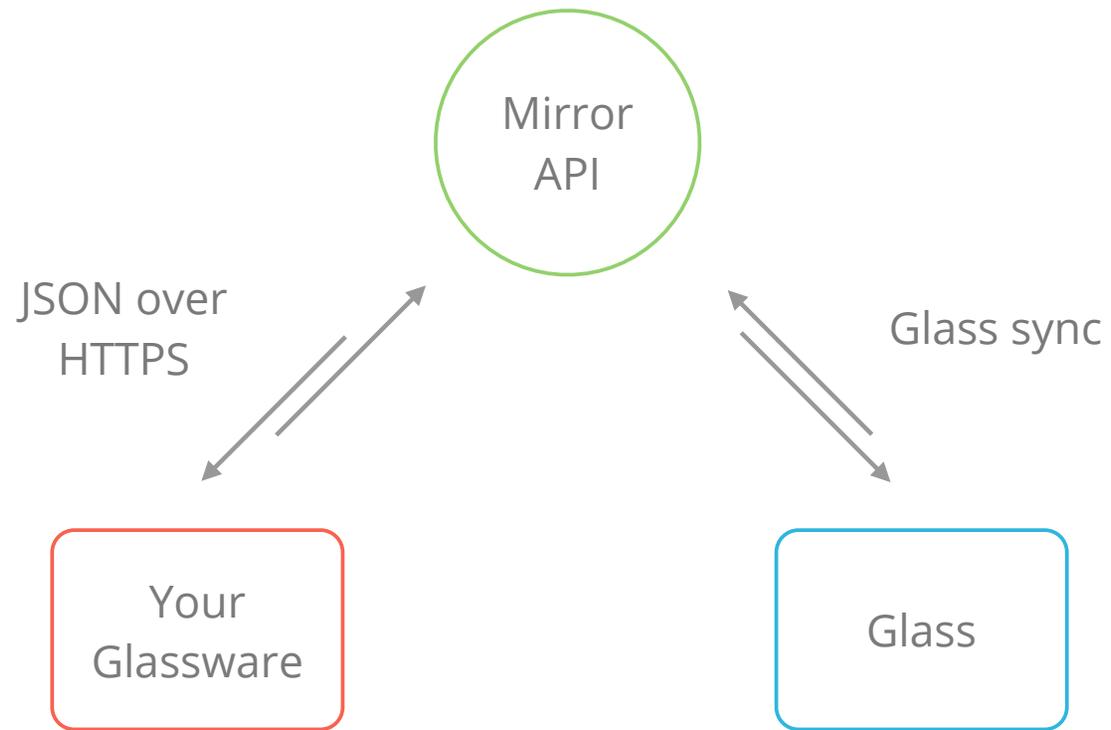




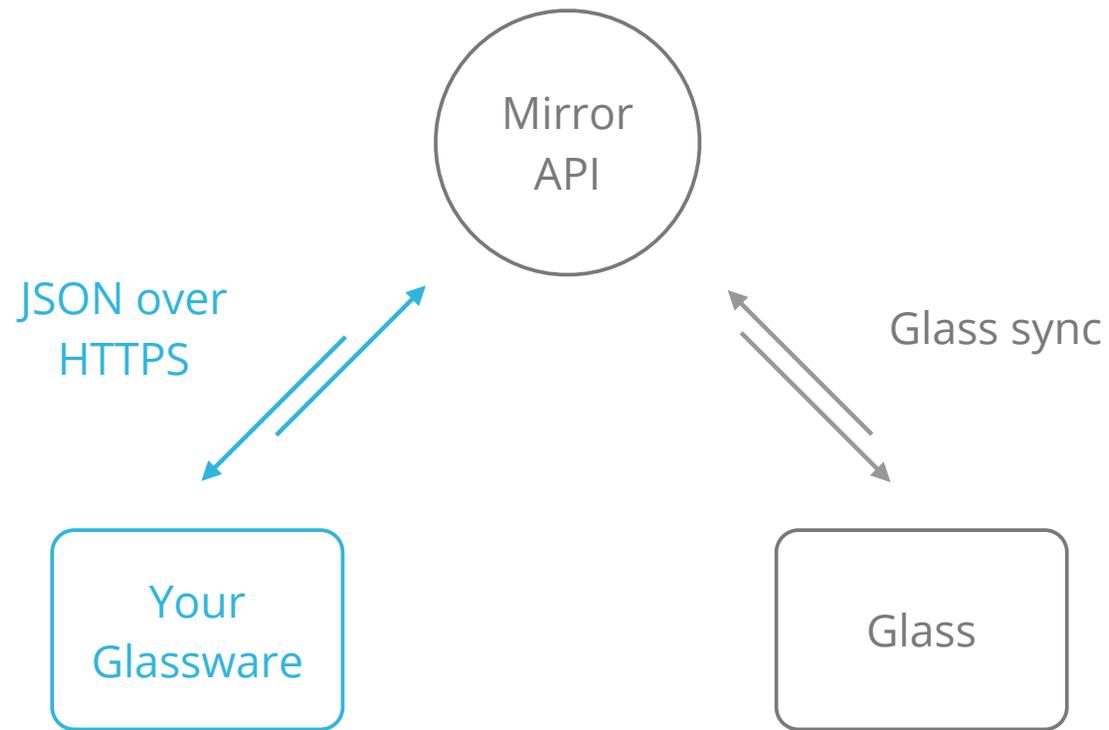
Mirror API

Let the JSON fly (over HTTPS)

Anatomy of the Mirror API



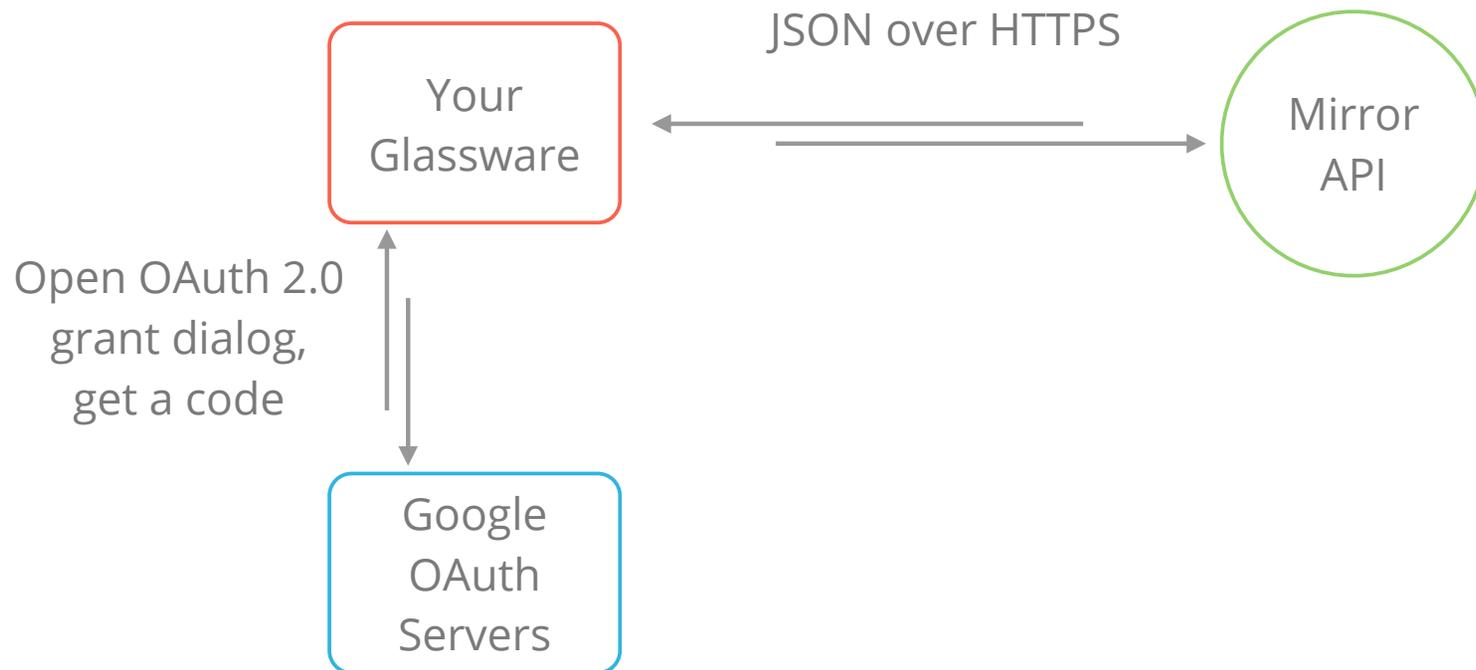
Anatomy of the Mirror API



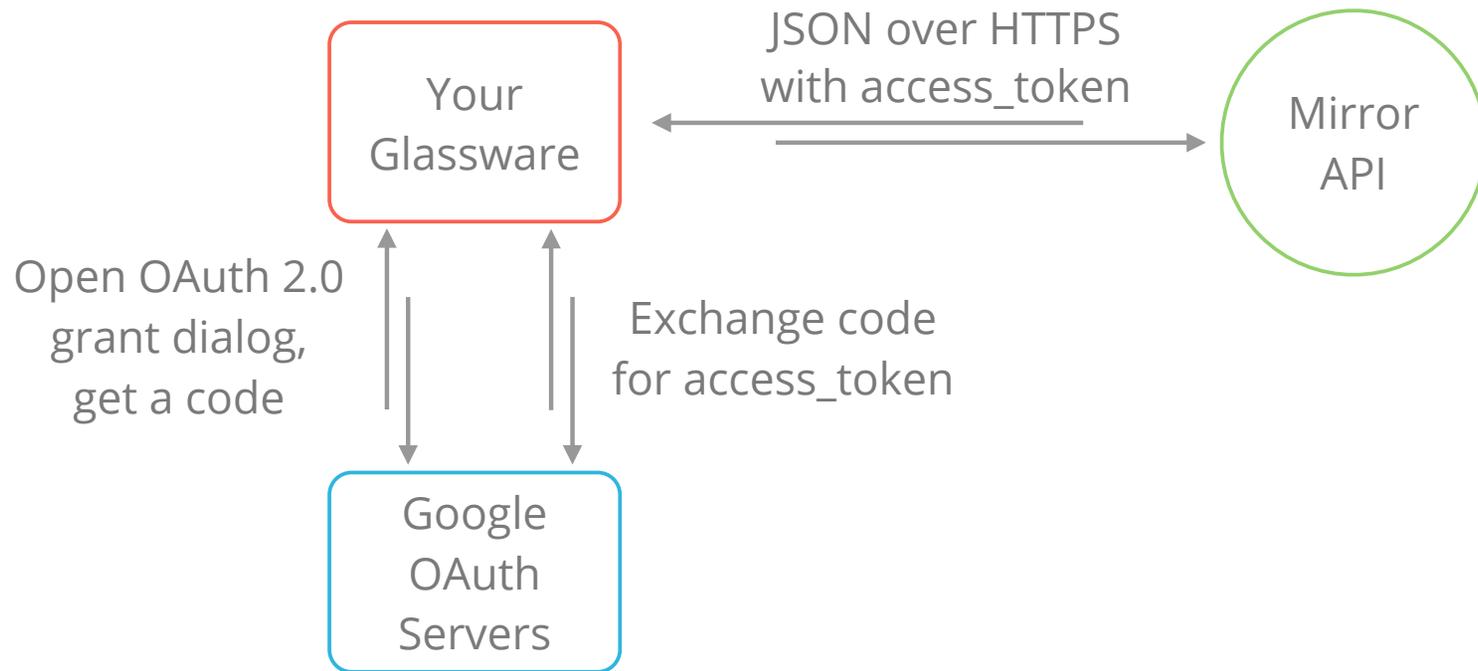
Authorization with OAuth 2.0



Authorization with OAuth 2.0



Authorization with OAuth 2.0



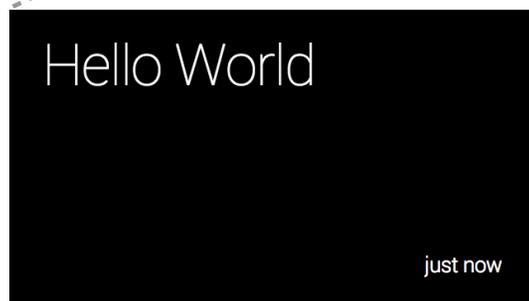


Mirror API - Collections

Where the JSON is

Timeline

Text Card



```
{"text": "Hello world"}
```

JSON



Timeline

Card with Attachment

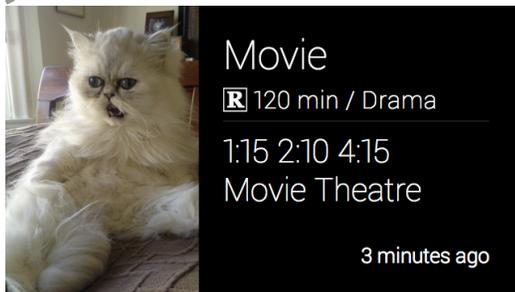


```
--mymultipartboundary JSON  
Content-Type: application/json; charset=UTF-8  
  
{ "notifications": { "level":"DEFAULT"}}  
--mymultipartboundary  
Content-Type: image/jpeg  
Content-Transfer-Encoding: binary  
  
[binary image data]  
--mymultipartboundary--
```



Timeline

HTML card



```
JSON
{"html": "<article><figure><img
src='https://example.com/manchego.jpg'></figure>
<section><h1 class='text-large'>Movie</h1>
<p class='text-x-small'>
<img src='https://example.com/r.png'>
120 min / Drama</p><hr>
<p class='text-normal'>1:15 2:10 4:15<br>
Movie Theatre</p>
</section></article>
""}

```



Timeline

Code

```
private TimelineItem insertTimelineItem(Mirror service) {  
    TimelineItem timelineItem = new TimelineItem();  
    timelineItem.setText("Hello Explorers!");  
  
    try {  
        return service.timeline().insert(timelineItem).execute();  
    } catch (IOException e) {  
        System.err.println("An error occurred: " + e);  
        return null;  
    }  
}
```

Java



Timeline

Code

```
private TimelineItem insertTimelineItem(Mirror service) {  
    TimelineItem timelineItem = new TimelineItem();  
    timelineItem.setText("Hello Explorers!");  
  
    try {  
        return service.timeline().insert(timelineItem).execute();  
    } catch (IOException e) {  
        System.err.println("An error occurred: " + e);  
        return null;  
    }  
}
```

Java



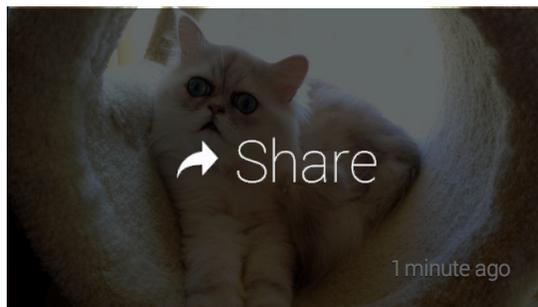


Playground Demo

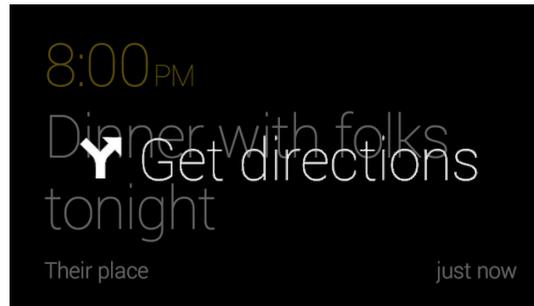
Creating cards

Menu Items

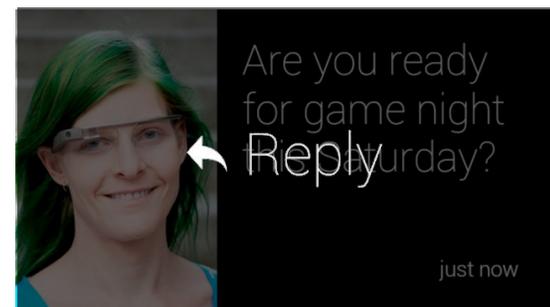
Built-in



```
{  
  "text": "Hello world",  
  "menuItems": [{  
    "action": "SHARE"  
  }]  
}
```



```
{  
  "location": {  
    "latitude": "37",  
    "longitude": "-122"  
  },  
  "menuItems": [{  
    "action": "NAVIGATE"  
  }]  
}
```

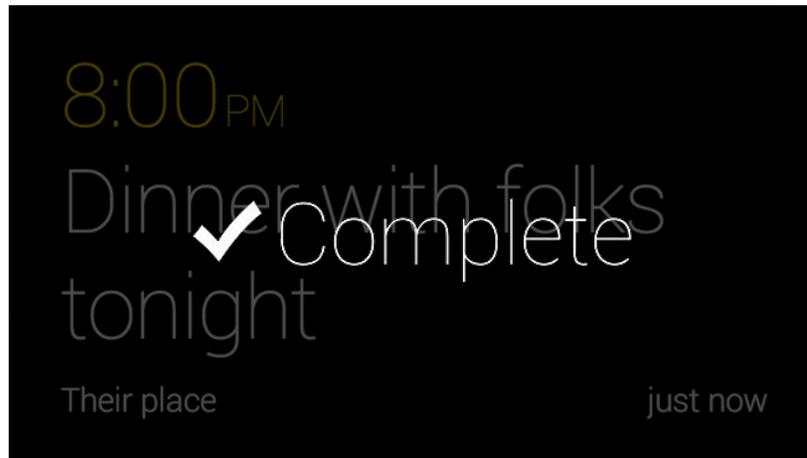


```
{  
  "text": "Hello world",  
  "menuItems": [{  
    "action": "REPLY"  
  }]  
}
```



Menu Items

Custom



```
{  
  "menuItems": [  
    {  
      "action": "CUSTOM",  
      "id": "complete"  
      "values": [{  
        "displayName": "Complete",  
        "iconUrl":  
          "https://example.com/complete.png"  
      }]  
    }  
  ] ...  
}
```

JSON



Menu Items

Built in

```
TimelineItem timelineItem = new TimelineItem();  
timelineItem.setText("Hello Explorers!");  
  
MenuItem menuItem = new MenuItem();  
menuItem.setAction("SHARE");  
  
timelineItem.setMenuItems(Arrays.asList(menuItem));
```

Java



Menu Items

Built in

```
TimelineItem timelineItem = new TimelineItem();  
timelineItem.setText("Hello Explorers!");  
  
MenuItem menuItem = new MenuItem();  
menuItem.setAction("SHARE");  
  
timelineItem.setMenuItems(Arrays.asList(menuItem));
```

Java



Menu Items

Built in

```
TimelineItem timelineItem = new TimelineItem();  
timelineItem.setText("Hello Explorers!");  
  
MenuItem menuItem = new MenuItem();  
menuItem.setAction("SHARE");  
  
timelineItem.setMenuItems(Arrays.asList(menuItem));
```

Java



Menu Items

Custom

```
TimelineItem timelineItem = new TimelineItem();
timelineItem.setText("Hello Explorers!");

MenuItem menuItem = new MenuItem();
menuItem.setAction("CUSTOM");
menuItem.setId("save_article");

MenuValue menuValue = new MenuValue();
menuValue.setDisplayName("Save article");
menuValue.setIconUrl(SAVE_ARTICLE_ICON_URL);

menuItem.setValues(Arrays.asList(menuValue));
timelineItem.setMenuItems(Arrays.asList(menuItem));
```

Java



Menu Items

Custom

```
TimelineItem timelineItem = new TimelineItem();
timelineItem.setText("Hello Explorers!");

MenuItem menuItem = new MenuItem();
menuItem.setAction("CUSTOM");
menuItem.setId("save_article");

MenuValue menuValue = new MenuValue();
menuValue.setDisplayName("Save article");
menuValue.setIconUrl(SAVE_ARTICLE_ICON_URL);

menuItem.setValues(Arrays.asList(menuValue));
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Java



Menu Items

Custom

```
TimelineItem timelineItem = new TimelineItem();  
timelineItem.setText("Hello Explorers!");  
  
MenuItem menuItem = new MenuItem();  
menuItem.setAction("CUSTOM");  
menuItem.setId("save_article");  
  
MenuValue menuValue = new MenuValue();  
menuValue.setDisplayName("Save article");  
menuValue.setIconUrl(SAVE_ARTICLE_ICON_URL);  
  
menuItem.setValues(Arrays.asList(menuValue));  
timelineItem.setMenuItems(Arrays.asList(menuItem));
```

Java



Menu Items

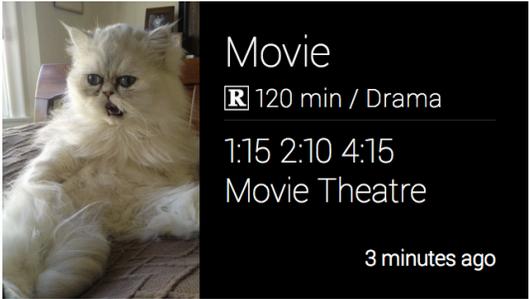
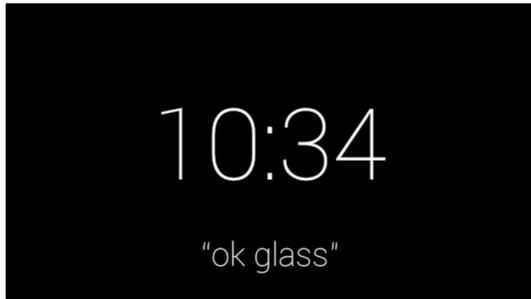
Custom

```
TimelineItem timelineItem = new TimelineItem();  
timelineItem.setText("Hello Explorers!");  
  
MenuItem menuItem = new MenuItem();  
menuItem.setAction("CUSTOM");  
menuItem.setId("save_article");  
  
MenuValue menuValue = new MenuValue();  
menuValue.setDisplayName("Save article");  
menuValue.setIconUrl(SAVE_ARTICLE_ICON_URL);  
  
menuItem.setValues(Arrays.asList(menuValue));  
timelineItem.setMenuItems(Arrays.asList(menuItem));
```

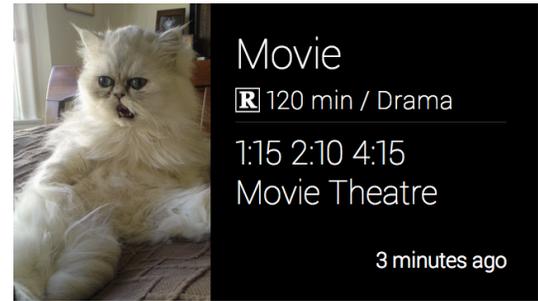
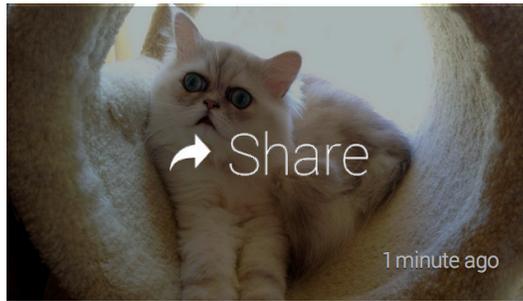
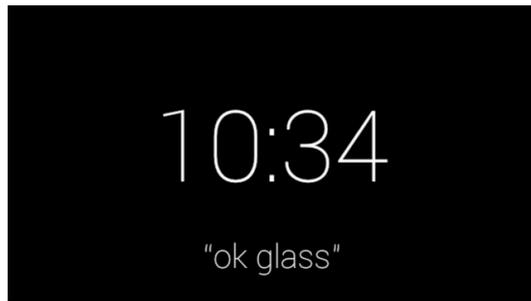
Java



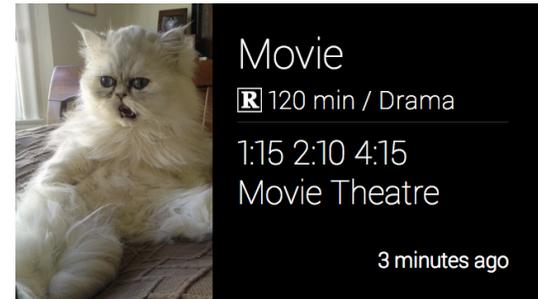
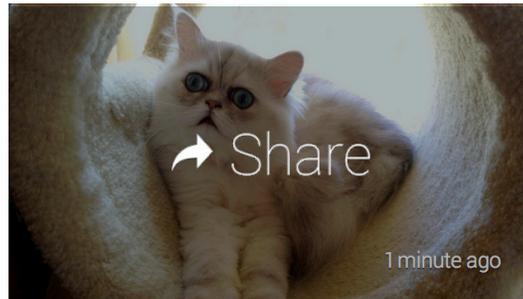
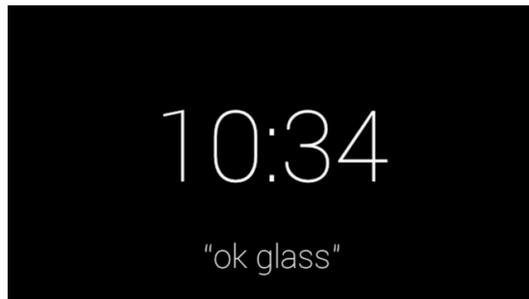
Contacts



Contacts



Contacts



Contacts

Kinds



A person



A group of people



A whole Glassware



Contacts

Code

```
private void insertContact(Mirror mirrorService) {  
    Contact contact = new Contact();  
    contact.setId("manchego_the_cat");  
    contact.setDisplayName("Manchego");  
    contact.setImageUrls(Arrays.asList(ICON_URL));  
    contact.setAcceptTypes(Arrays.asList("image/*"));  
  
    try {  
        mirrorService.contacts().insert(contact).execute();  
    } catch (IOException e) {  
        // Handle error.  
    }  
}
```

Java



Contacts

Code

```
private void insertContact(Mirror mirrorService) {  
    Contact contact = new Contact();  
    contact.setId("manchego_the_cat");  
    contact.setDisplayName("Manchego");  
    contact.setImageUrls(Arrays.asList(ICON_URL));  
    contact.setAcceptTypes(Arrays.asList("image/*"));  
  
    try {  
        mirrorService.contacts().insert(contact).execute();  
    } catch (IOException e) {  
        // Handle error.  
    }  
}
```

Java



Contacts

Code

```
private void insertContact(Mirror mirrorService) {  
    Contact contact = new Contact();  
    contact.setId("manchego_the_cat");  
    contact.setDisplayName("Manchego");  
    contact.setImageUrls(Arrays.asList(ICON_URL));  
    contact.setAcceptTypes(Arrays.asList("image/*"));  
  
    try {  
        mirrorService.contacts().insert(contact).execute();  
    } catch (IOException e) {  
        // Handle error.  
    }  
}
```

Java



Contacts

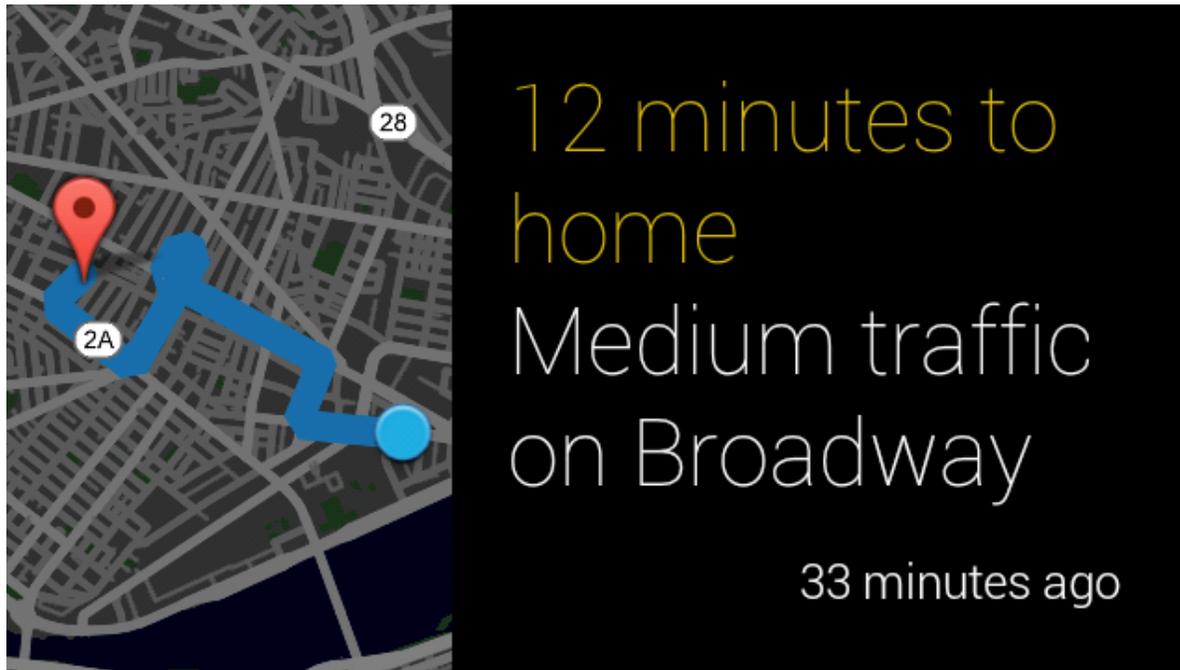
Code

```
private void insertContact(Mirror mirrorService) {  
    Contact contact = new Contact();  
    contact.setId("manchego_the_cat");  
    contact.setDisplayName("Manchego");  
    contact.setImageUrls(Arrays.asList(ICON_URL));  
    contact.setAcceptTypes(Arrays.asList("image/*"));  
  
    try {  
        mirrorService.contacts().insert(contact).execute();  
    } catch (IOException e) {  
        // Handle error.  
    }  
}
```

Java



Locations



Locations

Code

```
public static void printLatestLocation(Mirror service) {  
    Location location = service.locations().get("latest").execute();  
  
    System.out.println("Location recorded on: " + location.getTimestamp());  
    System.out.println(" > Lat: " + location.getLatitude());  
    System.out.println(" > Long: " + location.getLongitude());  
    System.out.println(" > Accuracy: " + location.getAccuracy() + " meters");  
}
```

Java



Locations

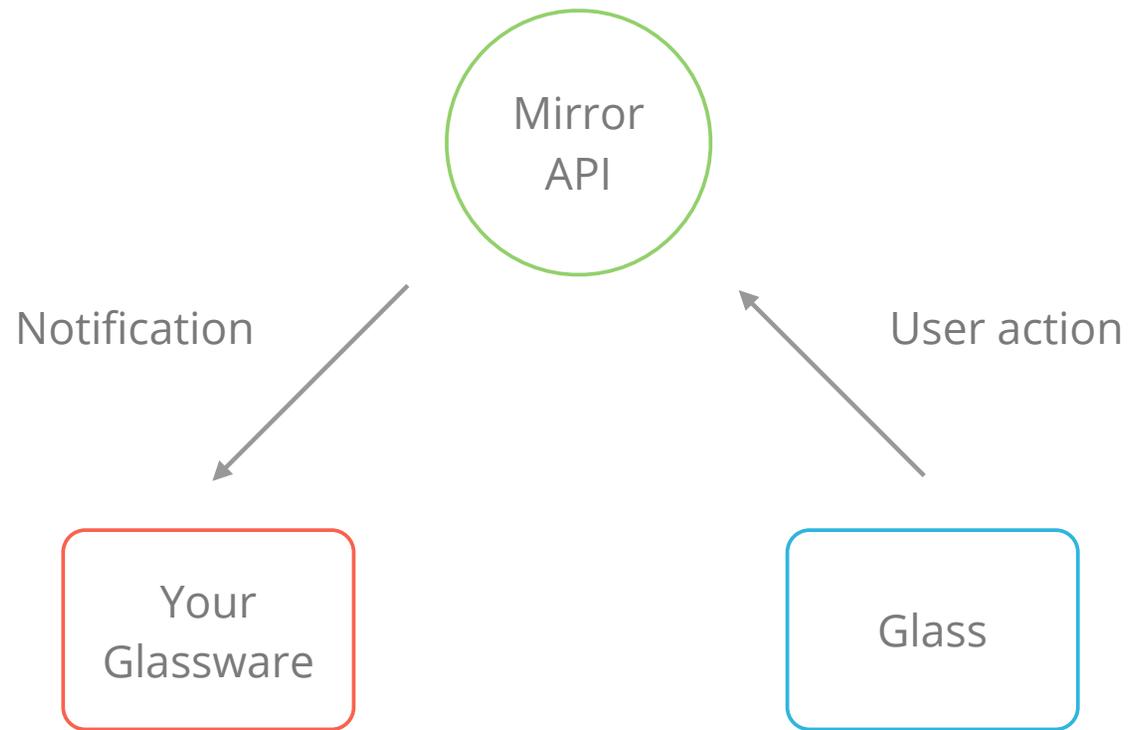
Code

```
public static void printLatestLocation(Mirror service) {  
    Location location = service.locations().get("latest").execute();  
  
    System.out.println("Location recorded on: " + location.getTimestamp());  
    System.out.println(" > Lat: " + location.getLatitude());  
    System.out.println(" > Long: " + location.getLongitude());  
    System.out.println(" > Accuracy: " + location.getAccuracy() + " meters");  
}
```

Java



Subscriptions



Subscriptions

Code - Subscribing

```
Subscription subscription = new Subscription();  
  
subscription.setCollection("timeline");  
subscription.setUserToken("chipotle123");  
subscription.setVerifyToken("best_cat_ever");  
subscription.setCallbackUrl("https://example.com/notify")  
  
service.subscriptions().insert(subscription).execute();
```

Java



Subscriptions

Code - Subscribing

```
Subscription subscription = new Subscription();  
  
subscription.setCollection("timeline");  
subscription.setUserToken("chipotle123");  
subscription.setVerifyToken("best_cat_ever");  
subscription.setCallbackUrl("https://example.com/notify")  
  
service.subscriptions().insert(subscription).execute();
```

Java



Subscriptions

Notification Payloads

Timeline

```
{  
  "collection": "timeline",  
  "itemId": "3hidvm0xez6r8_dacdb3b",  
  "operation": "UPDATE",  
  "userToken": "chipotle123",  
  "verifyToken": "best_cat_ever",  
  "userActions": [  
    {  
      "type": "SHARE"  
    }  
  ]  
}
```

JSON

Locations

```
{  
  "collection": "locations",  
  "itemId": "latest",  
  "operation": "UPDATE",  
  "userToken": "chipotle123",  
  "verifyToken": "best_cat_ever"  
}
```

JSON



Subscriptions

Code - Processing a Notification

```
protected void doPost(HttpServletRequest req, HttpServletResponse resp) throws IOException {  
    JsonFactory jsonFactory = new JacksonFactory();  
    Notification notification =  
        jsonFactory.fromInputStream(req.getInputStream(), Notification.class);  
  
    validateVerifyToken(notification.getVerifyToken());  
    String userId = notification.getUserToken();  
    Mirror mirrorService = getMirrorService(getCredential(userId));  
  
    if(notification.getCollection().equals("timeline")) {  
        String timelineId = notification.getItemId();  
        TimelineItem item = mirrorService.timeline().get(itemId).execute();  
        // Do cool stuff  
    }  
}
```

Java



Subscriptions

Code - Processing a Notification

```
protected void doPost(HttpServletRequest req, HttpServletResponse resp) throws IOException {  
    JsonFactory jsonFactory = new JacksonFactory();  
    Notification notification =  
        jsonFactory.fromInputStream(req.getInputStream(), Notification.class);  
  
    validateVerifyToken(notification.getVerifyToken());  
    String userId = notification.getUserToken();  
    Mirror mirrorService = getMirrorService(getCredential(userId));  
  
    if(notification.getCollection().equals("timeline")) {  
        String timelineId = notification.getItemId();  
        TimelineItem item = mirrorService.timeline().get(itemId).execute();  
        // Do cool stuff  
    }  
}
```

Java



Subscriptions

Code - Processing a Notification

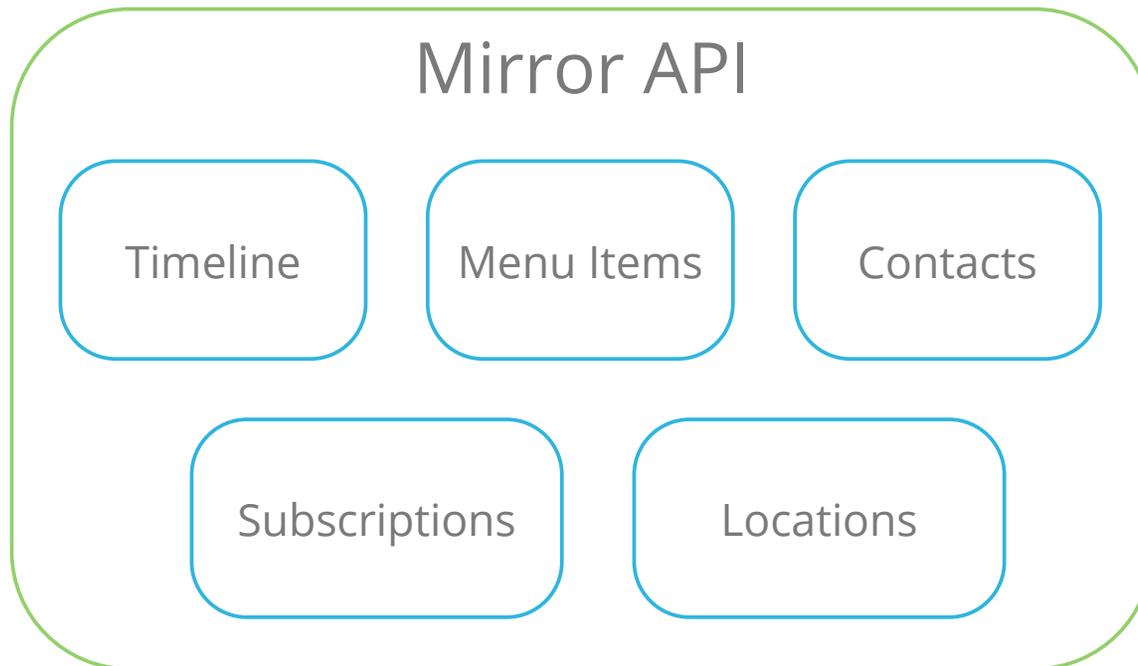
```
protected void doPost(HttpServletRequest req, HttpServletResponse resp) throws IOException {  
    JsonFactory jsonFactory = new JacksonFactory();  
    Notification notification =  
        jsonFactory.fromInputStream(req.getInputStream(), Notification.class);  
  
    validateVerifyToken(notification.getVerifyToken());  
    String userId = notification.getUserToken();  
    Mirror mirrorService = getMirrorService(getCredential(userId));  
  
    if(notification.getCollection().equals("timeline")) {  
        String timelineId = notification.getItemId();  
        TimelineItem item = mirrorService.timeline().get(itemId).execute();  
        // Do cool stuff  
    }  
}
```

Java



The Google Mirror API

Features





Piecing Together Glassware

With the powers of the Mirror API combined, they become... Glassware!



Cat Facts

=^_^=

Cat Facts

Demo

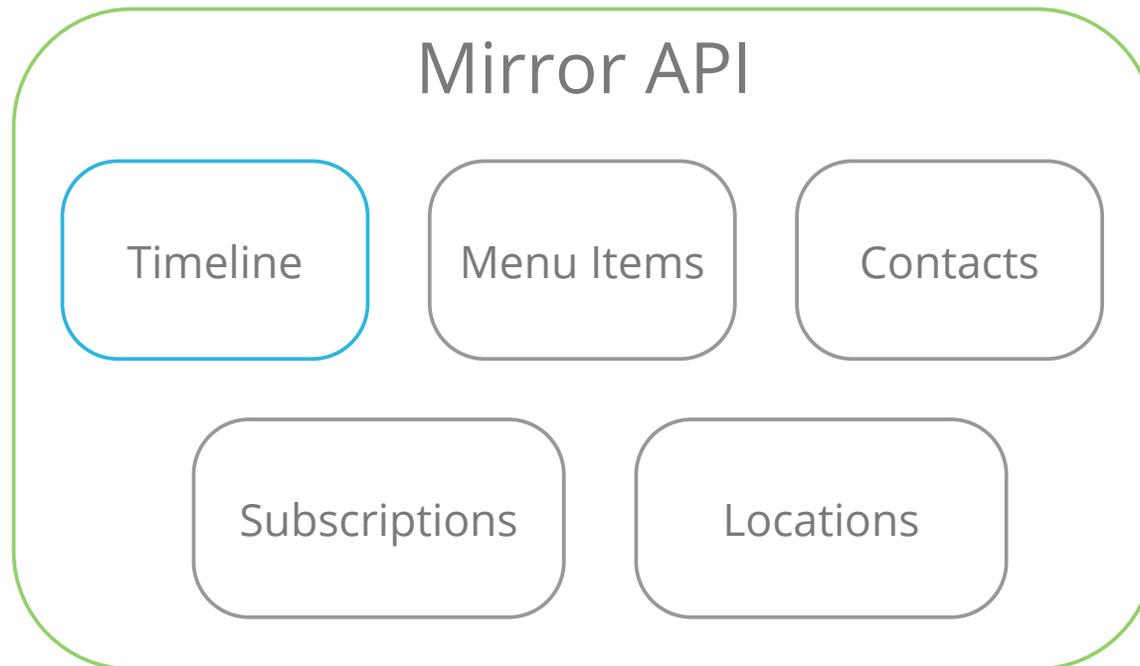
Did you know that
cats can see in the
dark?

just now



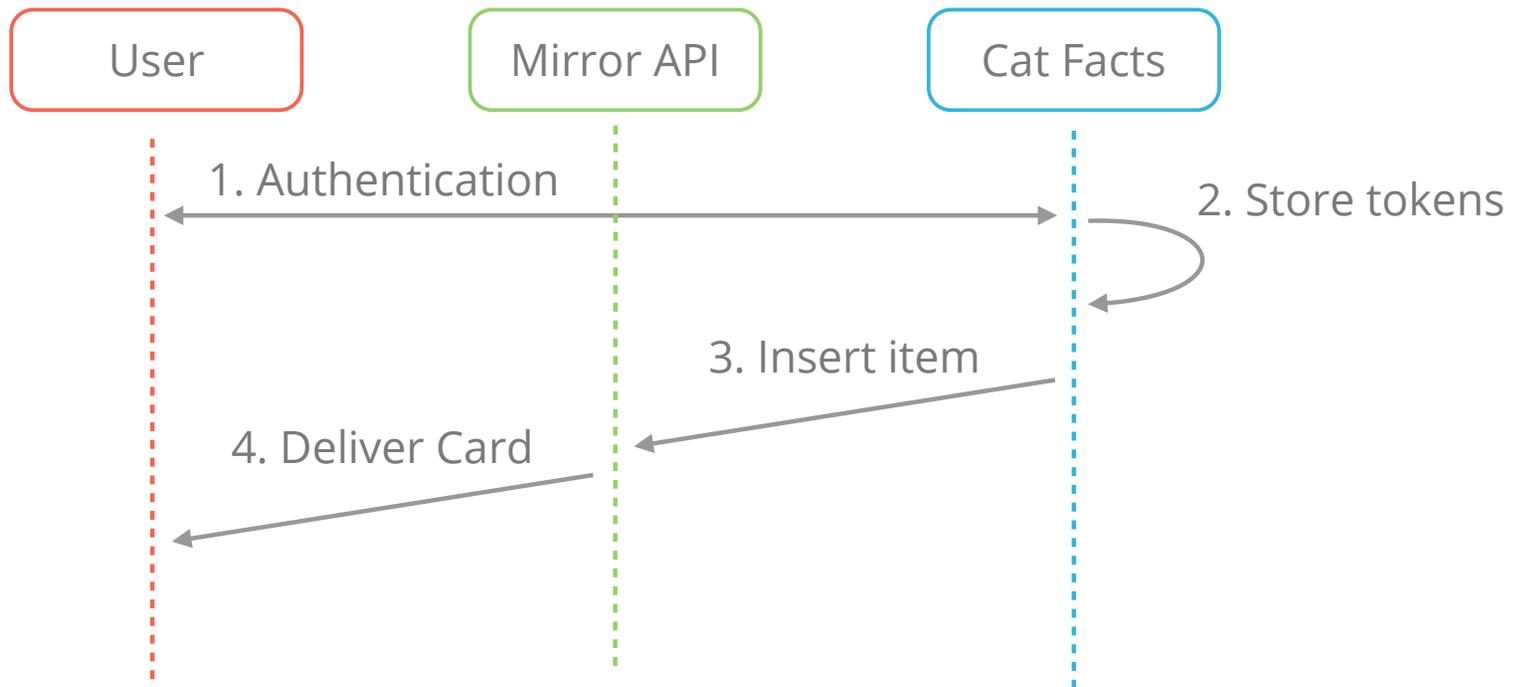
Cat facts

Features Used



Cat Facts

Flow



Cat Facts

Code

```
private void sendCatFacts() {  
    TimelineItem catFactItem = new TimelineItem().setText(getRandomCatFact());  
  
    for (String user : getAllUsers()) {  
        Credential credential = getCredentialForUser(user);  
        Mirror mirrorService =  
            new Mirror.Builder(HTTP_TRANSPORT, JSON_FACTORY, credential).build();  
        try {  
            mirrorService.timeline().insert(catFactItem).execute();  
        } catch (IOException e) {  
            // Handle exception.  
        }  
    }  
}
```

Java



Cat Facts

Code

```
private void sendCatFacts() {  
    TimelineItem catFactItem = new TimelineItem().setText(getRandomCatFact());  
  
    for (String user : getAllUsers()) {  
        Credential credential = getCredentialForUser(user);  
        Mirror mirrorService =  
            new Mirror.Builder(HTTP_TRANSPORT, JSON_FACTORY, credential).build();  
        try {  
            mirrorService.timeline().insert(catFactItem).execute();  
        } catch (IOException e) {  
            // Handle exception.  
        }  
    }  
}
```

Java



Cat Facts

Code

```
private void sendCatFacts() {  
    TimelineItem catFactItem = new TimelineItem().setText(getRandomCatFact());  
  
    for (String user : getAllUsers()) {  
        Credential credential = getCredentialForUser(user);  
        Mirror mirrorService =  
            new Mirror.Builder(HTTP_TRANSPORT, JSON_FACTORY, credential).build();  
        try {  
            mirrorService.timeline().insert(catFactItem).execute();  
        } catch (IOException e) {  
            // Handle exception.  
        }  
    }  
}
```

Java



Cat Facts

Code - Batched

```
private final class BatchCallback
    extends JsonBatchCallback<TimelineItem> {

    private int success = 0;
    private int failure = 0;

    public void onSuccess(TimelineItem item, HttpHeaders headers)
        throws IOException {
        ++success;
    }
    public void onFailure(GoogleJsonError error, HttpHeaders headers)
        throws IOException {
        ++failure;
    }
}
```

Java



Cat Facts

Code - Batched

```
BatchRequest batch = MirrorClient.getMirror(null).batch();
BatchCallback callback = new BatchCallback();

for (String user : users) {
    Credential userCredential = AuthUtil.getCredential(user);
    MirrorClient.getMirror(userCredential).timeline()
        .insert(allUsersItem).queue(batch, callback);
}

batch.execute();
message = callback.success + " succeeded; " + callback.failure + " failed.";
```

Java



Cat Facts

Code - Batched

```
BatchRequest batch = MirrorClient.getMirror(null).batch();
BatchCallback callback = new BatchCallback();

for (String user : users) {
    Credential userCredential = AuthUtil.getCredential(user);
    MirrorClient.getMirror(userCredential).timeline()
        .insert(allUsersItem).queue(batch, callback);
}

batch.execute();
message = callback.success + " succeeded; " + callback.failure + " failed.";
```

Java



Cat Facts

Code - Batched

```
BatchRequest batch = MirrorClient.getMirror(null).batch();
BatchCallback callback = new BatchCallback();

for (String user : users) {
    Credential userCredential = AuthUtil.getCredential(user);
    MirrorClient.getMirror(userCredential).timeline()
        .insert(allUsersItem).queue(batch, callback);
}

batch.execute();
message = callback.success + " succeeded; " + callback.failure + " failed.";
```

Java



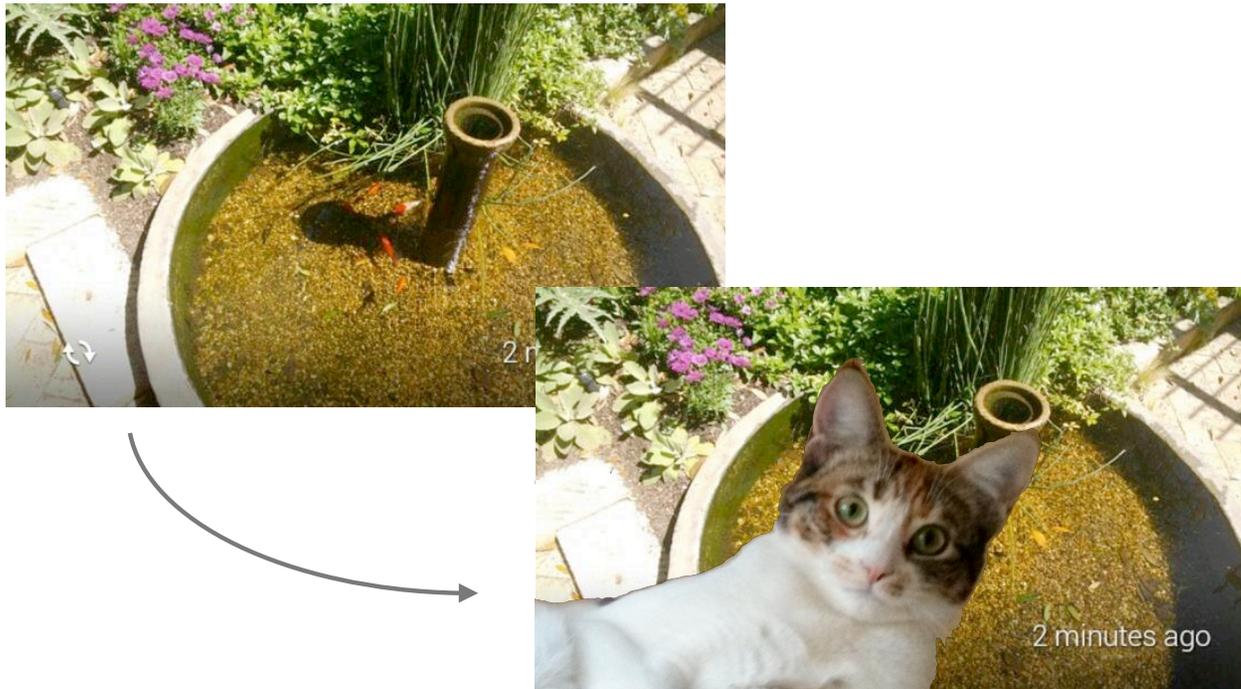


Add a Cat to That

Cats make any photo better

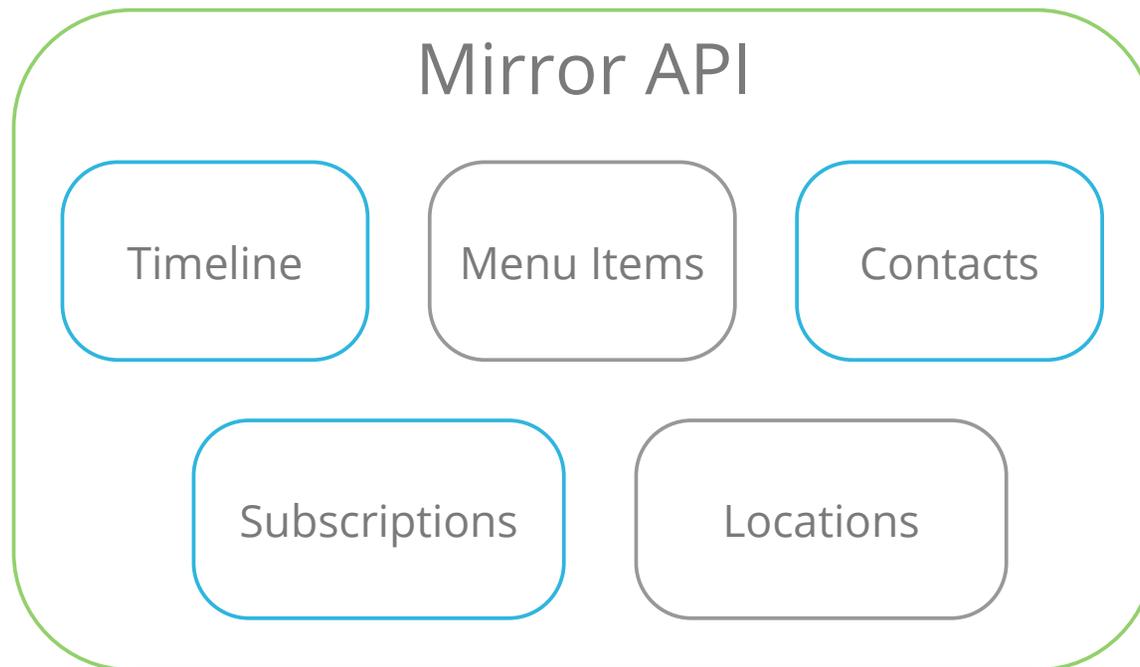
Add a Cat to That

Demo



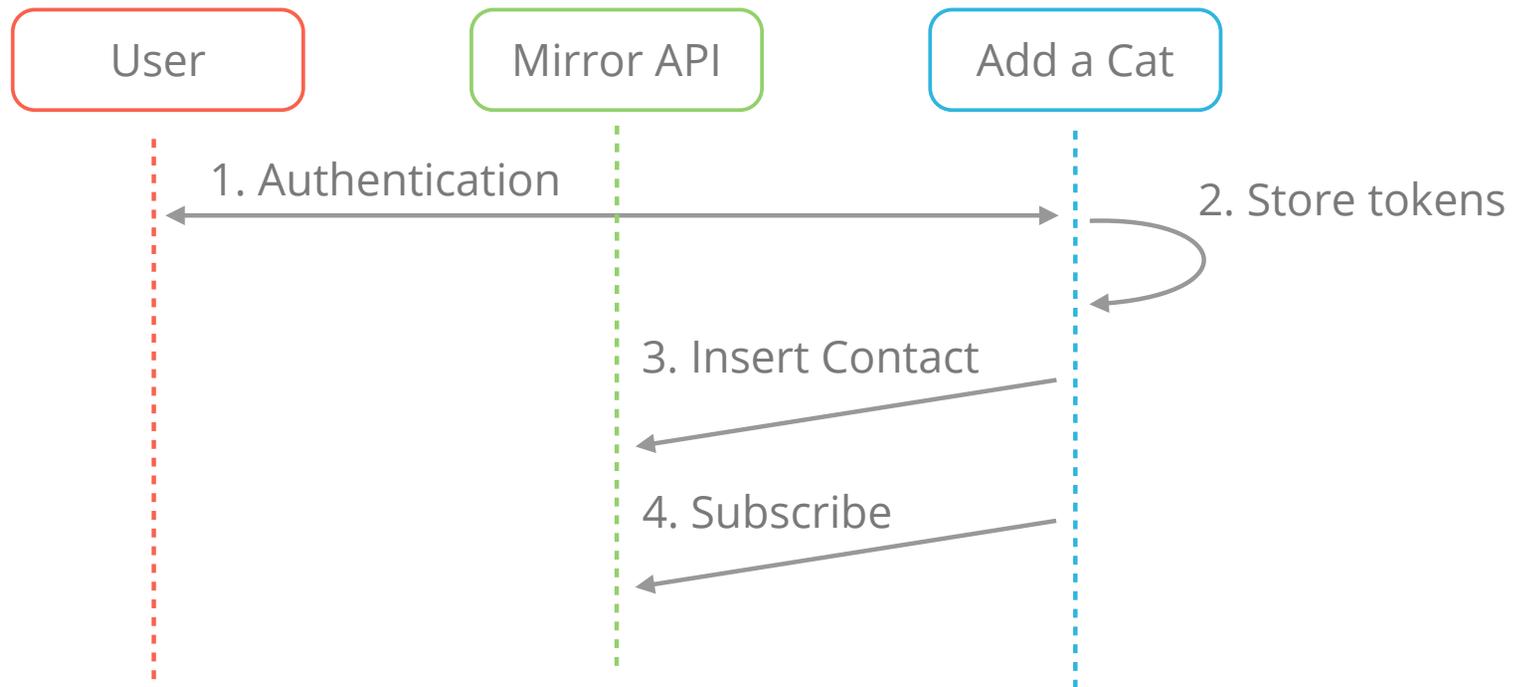
Add a Cat to That

Features Used



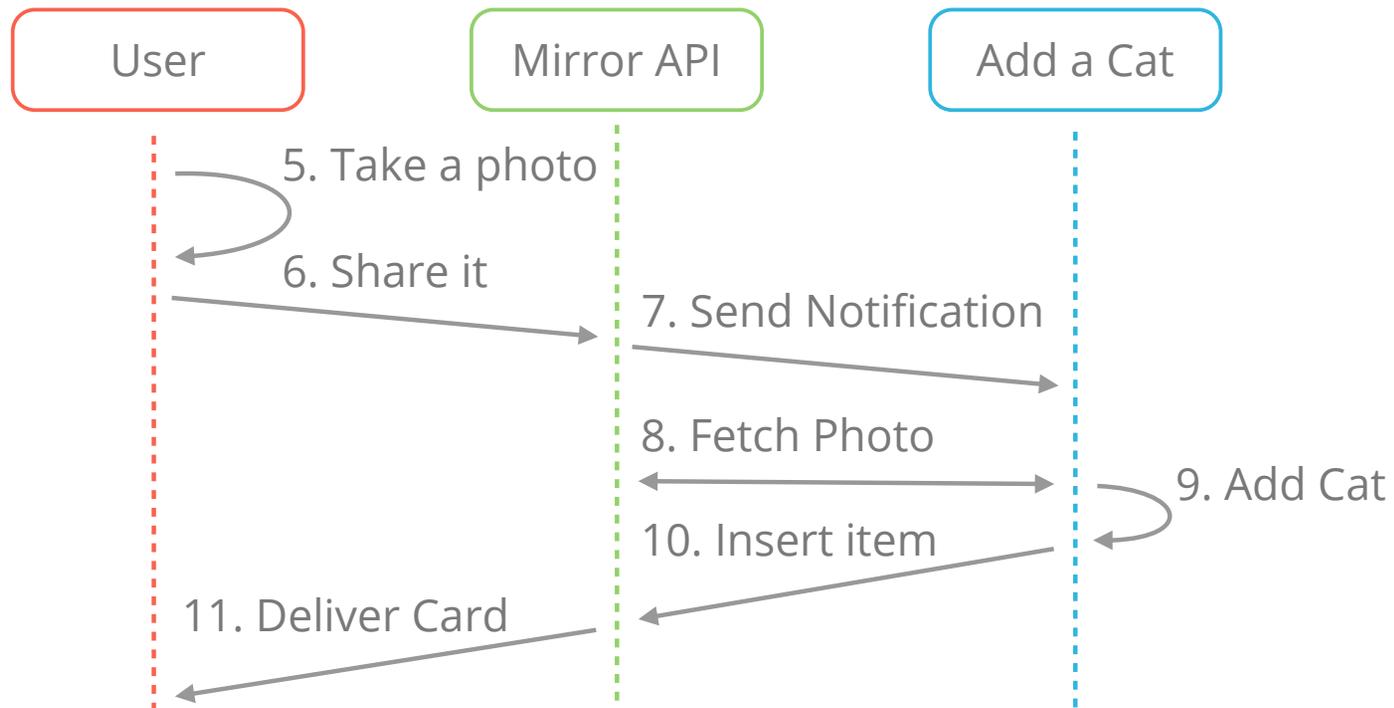
Add a Cat to That

Flow - Bootstrap



Add a Cat to That

Flow - Runtime



Add a Cat to That

Code - Bootstrap

```
private void insertContact(Mirror service) {  
    Contact contact = new Contact();  
    contact.setId("add_a_cat_to_that");  
    contact.setDisplayName("Add a cat to that");  
    contact.setImageUrls(Arrays.asList(ICON_URL));  
    contact.setAcceptTypes(Arrays.asList("image/*"));  
  
    service.contacts().insert(contact).execute();  
}
```

Java



Add a Cat to That

Code - Bootstrap

```
private void insertContact(Mirror service) {  
    Contact contact = new Contact();  
    contact.setId("add_a_cat_to_that");  
    contact.setDisplayName("Add a cat to that");  
    contact.setImageUrls(Arrays.asList(ICON_URL));  
    contact.setAcceptTypes(Arrays.asList("image/*"));  
  
    service.contacts().insert(contact).execute();  
}
```

Java



Add a Cat to That

Code - Bootstrap

```
private void subscribeToNotifications(Mirror service, String userId) {  
    Subscription subscription = new Subscription();  
    subscription.setCollection("timeline");  
    subscription.setUserToken(userId);  
    subscription.setVerifyToken(createVerifyToken(userId));  
    subscription.setCallbackUrl("https://catfacts.example.com/notify");  
  
    service.subscriptions().insert(subscription).execute();  
}
```

Java



Add a Cat to That

Code - Bootstrap

```
private void subscribeToNotifications(Mirror service, String userId) {  
    Subscription subscription = new Subscription();  
    subscription.setCollection("timeline");  
    subscription.setUserToken(userId);  
    subscription.setVerifyToken(createVerifyToken(userId));  
    subscription.setCallbackUrl("https://catfacts.example.com/notify");  
  
    service.subscriptions().insert(subscription).execute();  
}
```

Java



Add a Cat to That

Code - Handle Notification

```
protected void doPost(HttpServletRequest req, HttpServletResponse resp)
    throws IOException {
    JsonFactory jsonFactory = new JacksonFactory();
    Notification notification =
        jsonFactory.fromInputStream(req.getInputStream(), Notification.class);

    validateVerifyToken(notification.getVerifyToken());

    String userId = notification.getUserToken();
    Mirror mirrorService = getMirrorService(getCredential(userId));

    for (UserAction action : notification.getUserActions()) {
        if (action.getType() == "SHARE") {
            addACatToThat(mirrorService, notification.getItemId());
        }
    }
}
```

Java



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Java



Add a Cat to That

Code - Handle Notification

```
private void addACatToThat(Mirror service, String itemId) throws IOException {  
    TimelineItem item = service.timeline().get(itemId).execute();  
  
    for (Attachment attachment : item.getAttachments()) {  
        attachment = service.timeline().attachments().get(itemId, attachment.getId()).execute();  
        InputStream photoBytes = downloadAttachment(service, attachment.getContentType());  
  
        InputStream catPhotoBytes = processPhoto(photoBytes);  
  
        service.timeline().attachments().delete(itemId, attachment.getId()).execute();  
        InputStreamContent catPhotoStream = new InputStreamContent("image/jpeg", catPhotoBytes);  
        service.timeline().attachments().insert(itemId, catPhotoStream).execute();  
    }  
  
    item.getMenuItems().add(new MenuItem().setAction("SHARE"));  
    service.timeline().update(itemId, item).execute();  
}
```

Java



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Code - Handle Notification

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Java





Next steps

Google I/O

Glass track

Day 2	10am - 11am	11:15am - 11:55am	12:45pm - 1:25pm	1:40pm - 2:20pm	2:35pm - 3:15pm	3:30pm - 4:10pm
 Glass	Developing For Glass Room 2   		Building Glass Services with the Google Mirror API Room 7   		Voiding Your Warranty: Hacking Glass Room 2  	Fireside Chat with the Glass Team Room 7  



Google I/O

Sandbox





Resources

developers.google.com/glass/community



GitHub





Resources

Explorer Community

www.glass-community.com

<Thank You!>

<https://developers.google.com/glass>

google.com/+AlainVongsouvanh

google.com/+JennyMurphy





Google
Developers