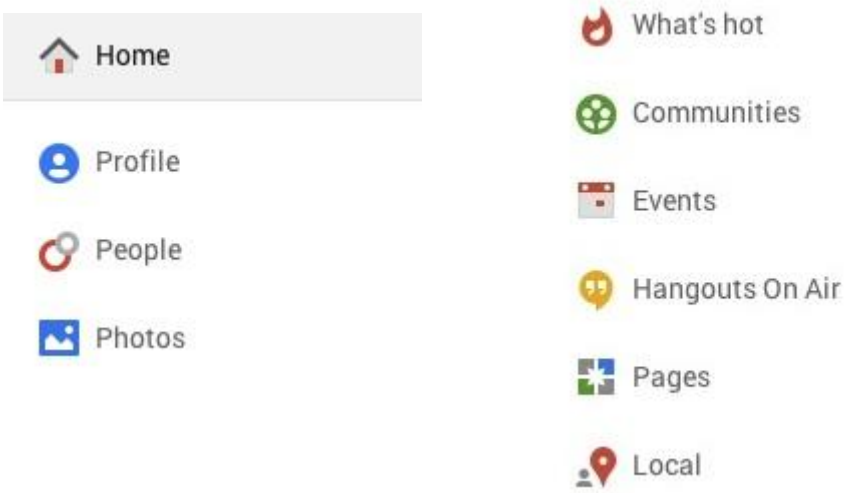
CSS Modules in Google+

+Shubhie Panicker
shubhie@gmail

Problems of Large Apps



Lots of features => Lots of JS & CSS

CSS size: ~ 870K uncompressed / ~ 175k compressed

Problems of ~~Large~~ Apps

Writing maintainable CSS

CSS Problems in Google+

- Initial bundle is too big and too slow
- Manually curated CSS is prone to reordering
  - Broken UI
  - Specificity wars

What's this talk about?

- Module System
  - Reduce CSS size
  - Cut down initial load time
- Dependency System
  - Needed for shared code
  - Vastly improved CSS development
    - Deterministic & correct cascade order
    - Never fight specificity
- Status

Identify shared code

- Start with the obvious: repeating UI elements
- Lot of repeating patterns in Google+

Share what's new...

Text Photos Link Video Event

Trey Ratcliff
Shared publicly - 4:15 PM

#BurningMan

The Music Before they Burned the Church

Here's a photo from the Burning Man photowalk - thanks again everyone for coming out! It was so fun!! :) I'm looking forward to seeing all the photos as people begin to upload them.

This inventive church has hymn sheets that fly out of the organ. When people sit down to play, all the sheets light up in different colors and flow out of the church through the windows and the roof. It is a really amazing piece of art. It's called the "Church Trap" because right behind me is a big stick that is holding up one end of the church... Last night they burned the whole thing down while we sat around the outside to watch... **#BurningMan**

PBS
Shared publicly - 4:25 PM

Pulitzer Prize-winning author Hedrick Smith says America has lost the title of "the land of opportunity." He claims that the way we have responded with our New Economy has put the middle class in an ever-tightening financial squeeze.

Is he right? If so, how do we reclaim the American Dream? (via Next Avenue)

How to Reclaim the American Dream

to.pbs.org

+30 6

Hide comments

2 older comments

Martin Lewitt 5:23 PM
I wonder why PBS chose to push Hedrick Smith's book?

D. Lamar Sobotor 6:09 PM
Who is he and why should anyone care?

Eric Anderson 6:28 PM +1
Regardless of who he is, the US has less socioeconomic upward mobility than most other developed economies. So

Share what's new...

Text | Photos | Link | Video | Event

Shubhie Panicker
Shared privately - Aug 4, 2013

Feel free to bounce around ideas here.
Also suggestions for Japanese grocery. We've been happy with sushi grade fish selection at Mitsuwa.

Japanese cooking adventure

Sun, August 18, 4:00 PM
683 Waverley St
Katelyn Mann, Rebecca S., Jonathan Shneier + 7 others went

Did you go?

Yes | +0 guests | Add photos

+1

25 comments

Rebecca S. Aug 18, 2013
I grabbed little rice block shapers and some nice looking green tea (genmai cha). We're caltraining it down, eta is

In your circles 164 people

Have you in circles 426 people

Shubhie Panicker was tagged in **Malte Ubl**'s album.

Shubhie Panicker
Shared privately - Aug 16, 2013

+5

Share what's new...

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Shared privately - Aug 16, 2013

+5

San Francisco Bay Area Photography

Anything Bay Area related

Notifications off

Search community

- **All posts**
- Discussion
- Weather Reports
- Webcams / Links
- Shooting Locations 1
- Local Events
- Gear
- ~Photos
- Questions?

Share what's new...

Text Photos Link Video Event

John Peterson
Shooting Locations - 6:55 PM

Vines outside Sonoma California

+1 Add a comment...

Alan Musgrove
Discussion - 11:32 AM #Jazz

The Cools, Filmore Jazz Festival

About this community

Invite people | Share this community

I have started this group to be the hotspot for all the Bay Area and surrounding area. Photowalks, locations, tips, weather, and what ever you feel people need to know about.

PLEASE post photos in Photo section above! Thanks

San Francisco

Vera Devera
~Photos - 4:04 PM #SanFrancisco

Happy Labor Day! Find a moment to enjoy the little things in life.

#SanFrancisco #panoramic

+3 Add a comment...

Stephen Schwerdfeger
~Photos - 9:34 AM

meeting a friend

San Francisco Bay Area Photography

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+3 | Add a comment...

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meeting a friend

Share Edit Tag people Slideshow More

Shubhie Panicker
Jun 6, 2013

Add caption

Photo details

+1

Show activity

3 comments

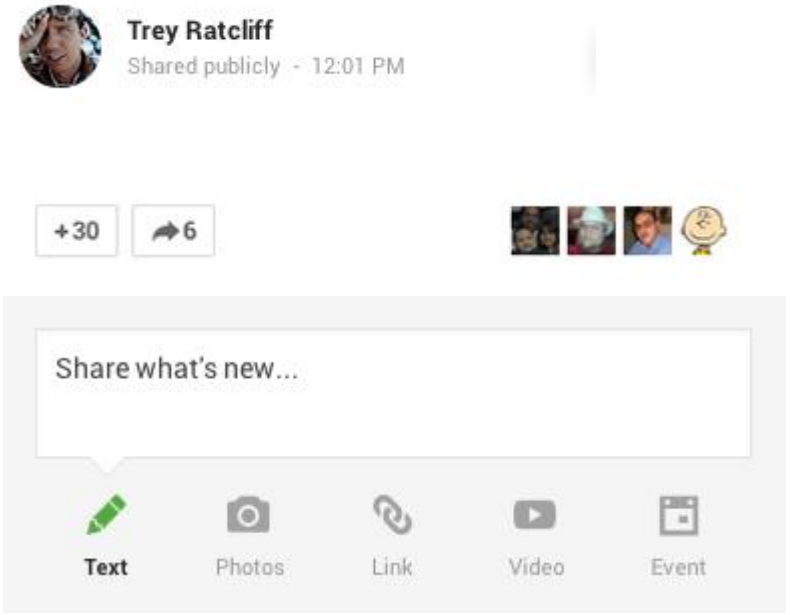
Tom Upton
Jun 24, 2013
Nice shot! Point Lobos is really unique and I remember every time I go there. Good color!

Toby Smith
Jun 24, 2013
That's a great shot. Very nice!

Shubhie Panicker
Jun 24, 2013
Thanks!

Add a comment...

Shared Styles



In addition, even more shared styles:

- across Google+: fonts, colors
- across Google: buttons, checkboxes ..

Competing goals

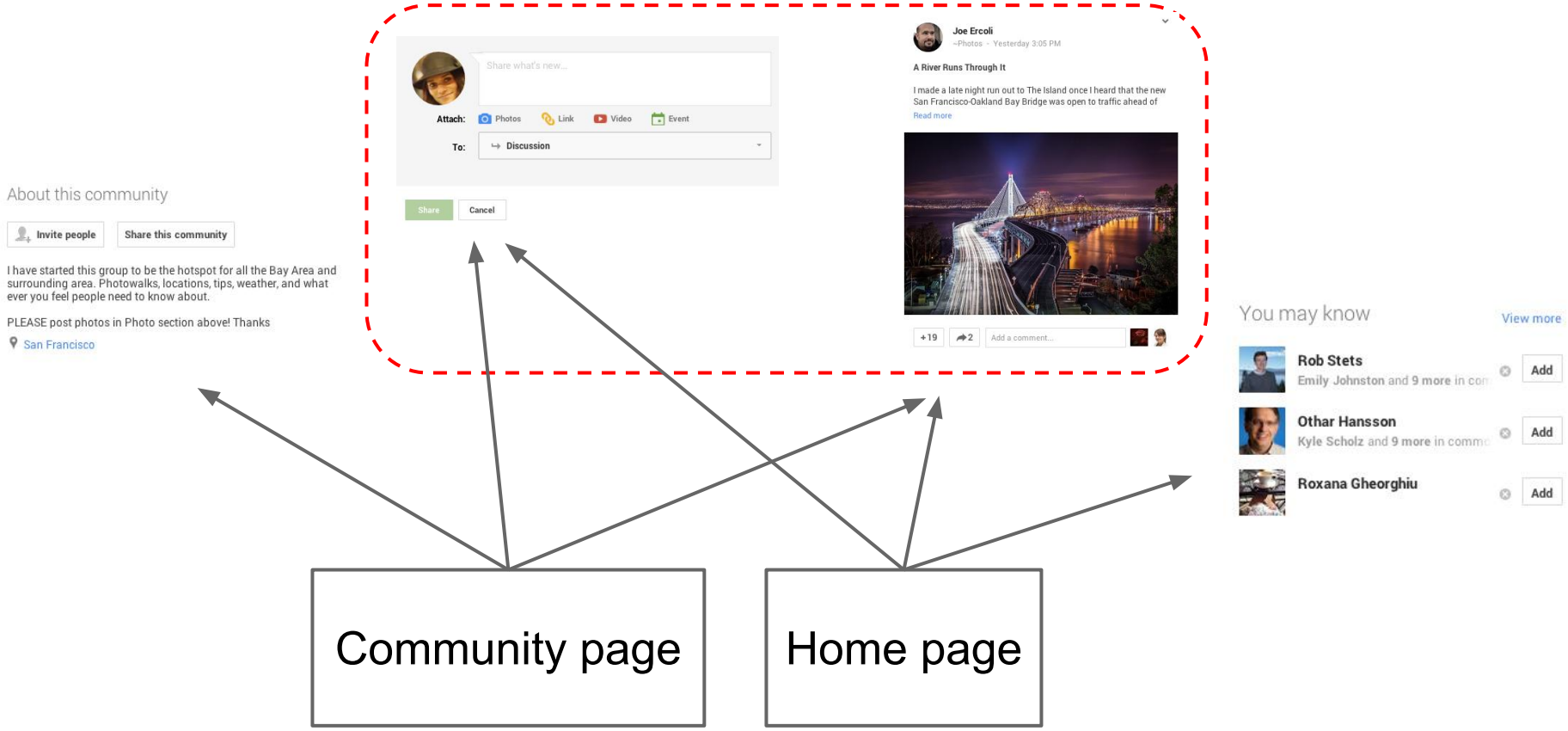
Features developed by different teams

- Split code by project boundary - BUT ALSO
- Share common styles

Need a dependency system.

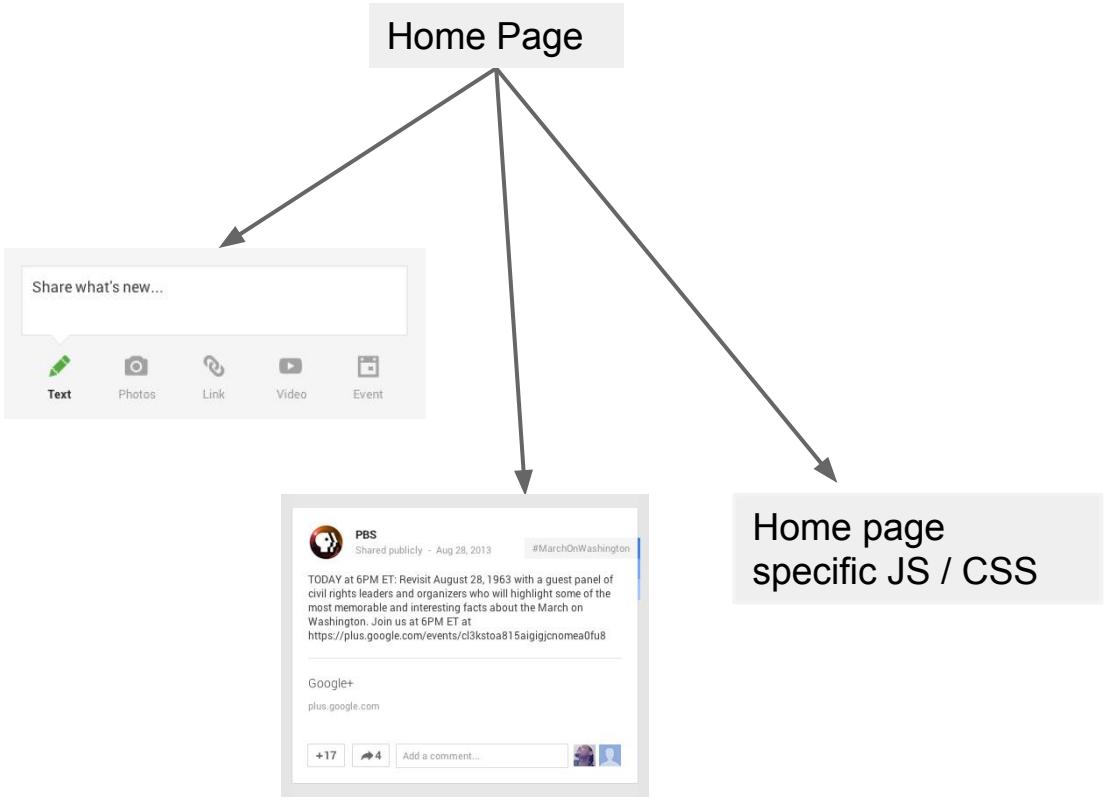
Shared Code

- Write once
- Download once
- Download the minimum needed

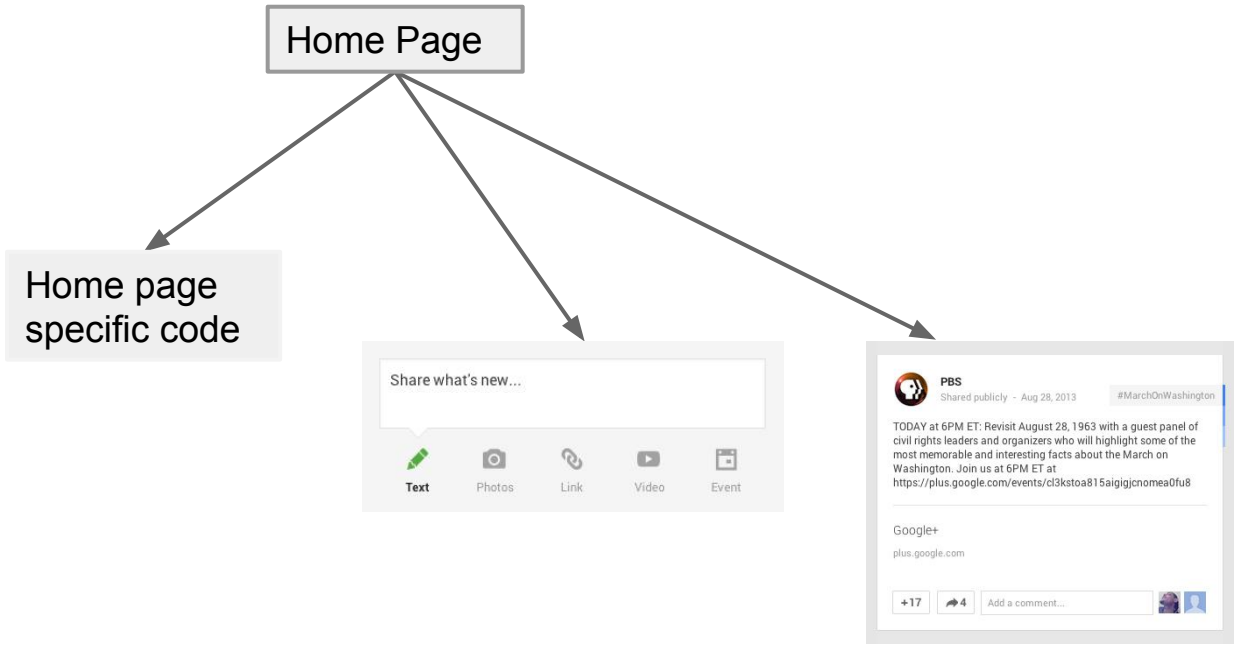


Consider ALL the code needed

code = Template + JS + CSS

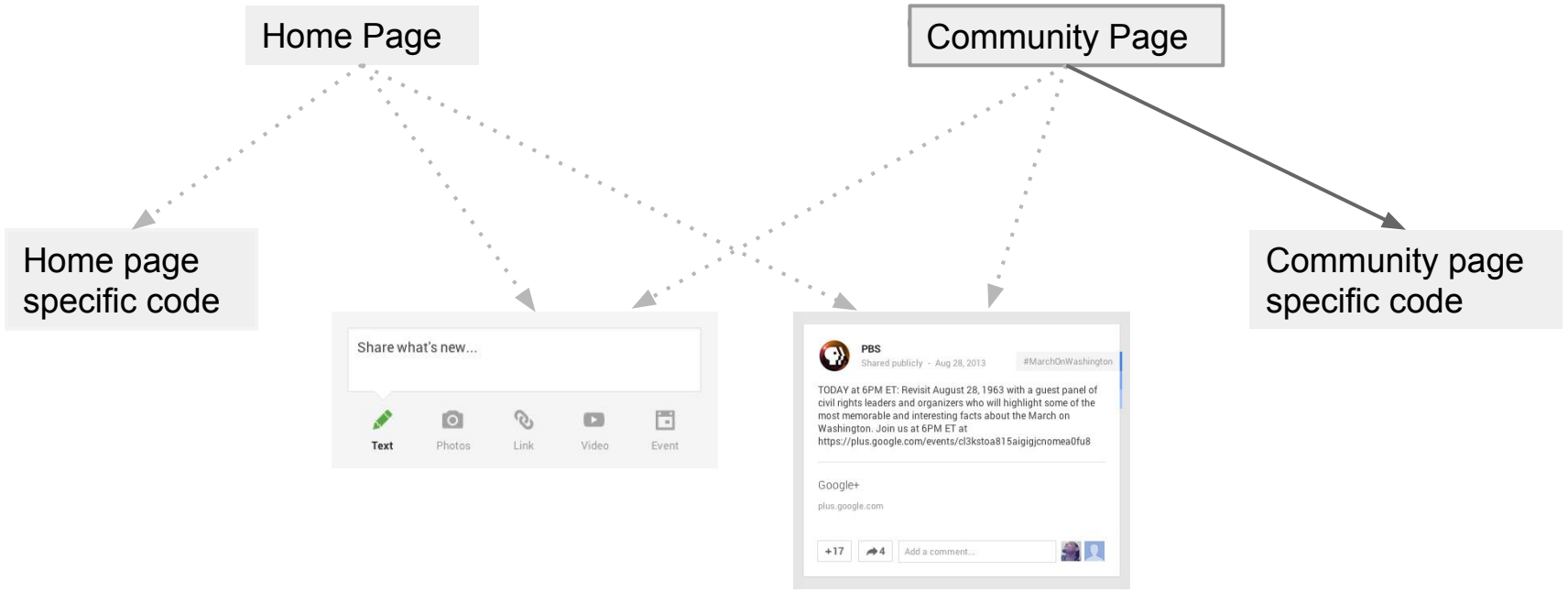


GOAL: Make initial page load fast



GOAL: Just download what we need when we need it.

Incrementally add code for features as they are surfaced by user.



Building on solution for JS

JS Modules

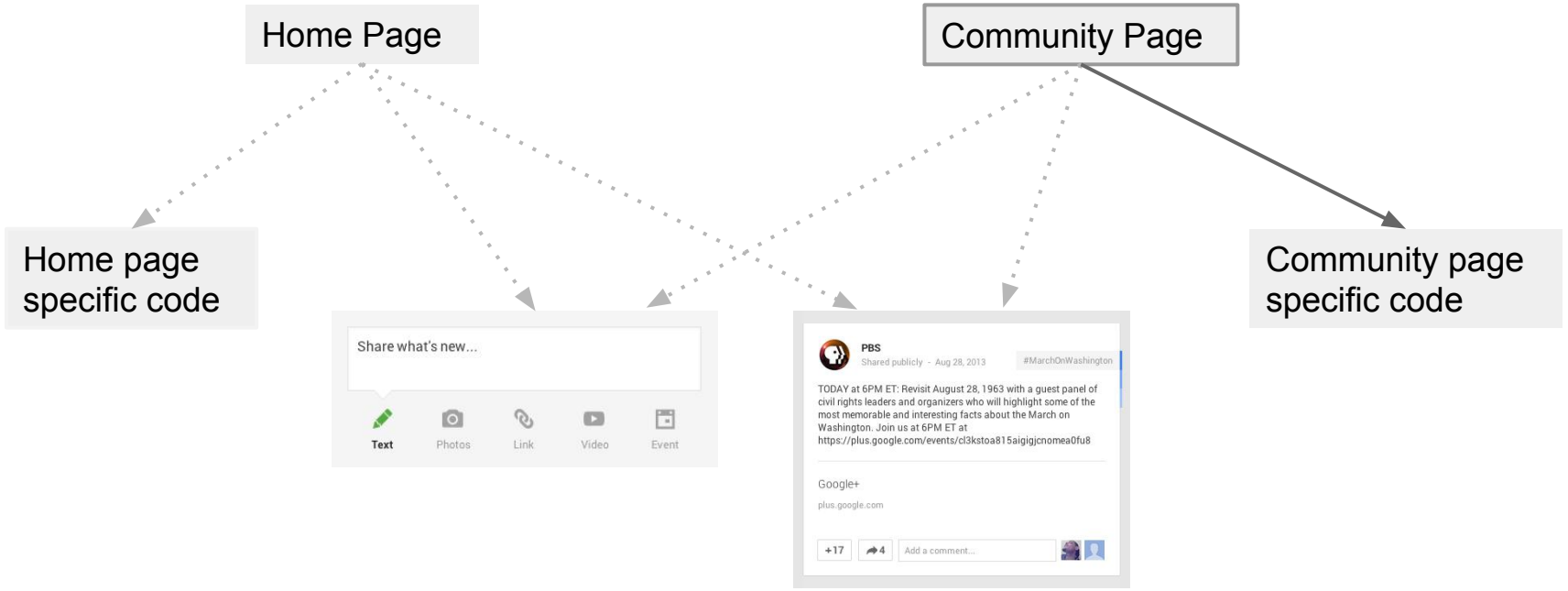
- Incremental download solved.
- Examples
  - AMD, CommonJS
  - Open source Google moduleserver

- No solution for CSS.
  - Can we use the same solution?

GOAL: Safe incremental download.

Late module must not override base styles from earlier module.

No UI regressions on previous pages.



CSS is not so simple.

Challenges:

- Safety: CSS load order can alter styles for previously loaded pages
- Need dependency system but no notion of deps!
  - **require** in CommonJs; **import** in java, python
  - How to include only what is used?

Cannot simply piggyback on JS modules.

- **GOAL**: Deliver minimum CSS. Incrementally. And Safely.

- Challenges
  - Bundle CSS with dependencies
  - Download CSS as needed
  - Safely compose CSS in the browser

Need a Module System

1. Dependency System
    - Bundle CSS with dependencies
2. Assembly & Serving system
    - Download as needed
    - Safely compose in browser

Challenge #1

Bundling CSS

Modules & Dependencies

CSS Module

- Bundle of CSS - supports a page of our site
- Downloaded together

Types of CSS dependencies

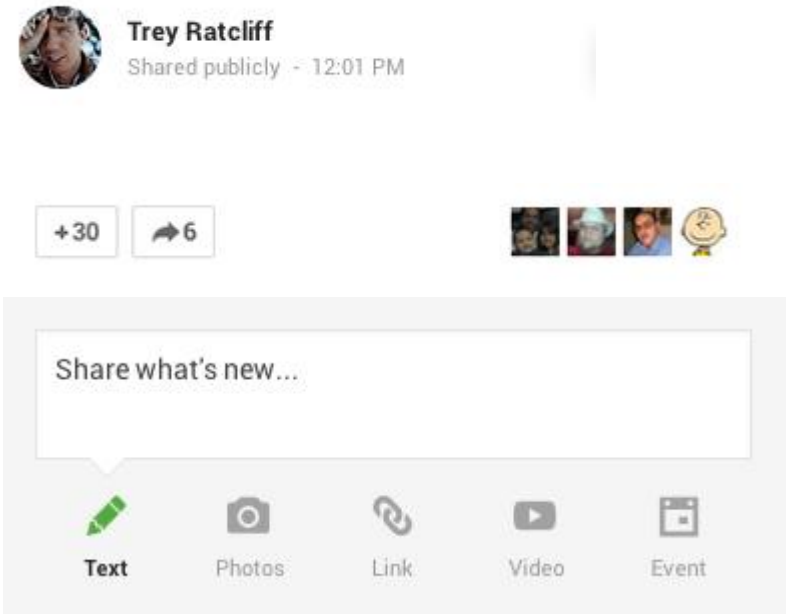
1. CSS from shared components
2. Fonts, colors etc. -- constants & mixins
3. Common CSS libraries

Naive solutions don’t work

- Don’t duplicate
  - Can’t just use multiple CSS @import
- Only include what you need
  - Eg. only want 1 of n variants of a component
- No single “shared deps” module for entire site!

I. CSS for shared components

Which CSS belongs to which of these?



Peg CSS to ‘components’

- Identify shared components
  - CSS comes with the component
- Bundle component code together
  - Component = Template + JS + CSS

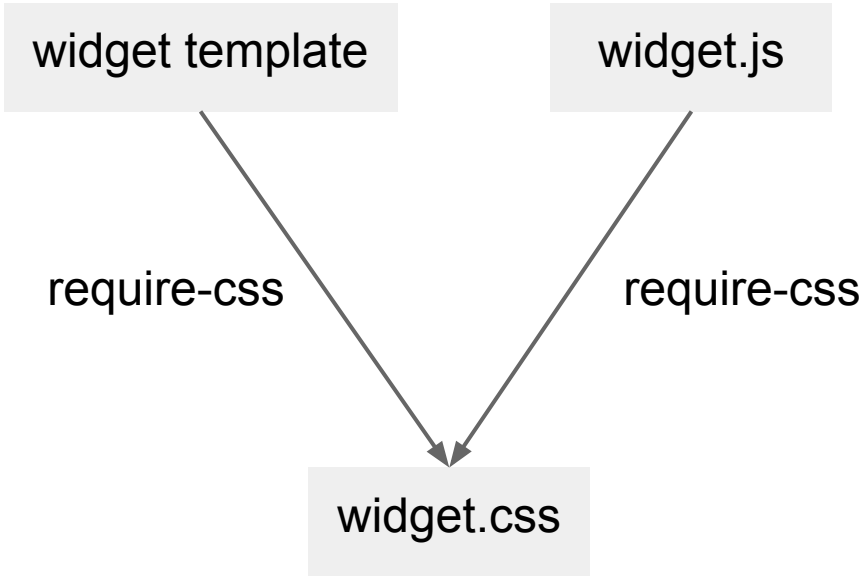
Similar to CSS *legos*

- Existing idea: reusable groups of CSS

- New idea: self contained components
  - Include Template + JS + CSS
  - Let the framework do the work
  - … not just disciplined programming

How to create self contained components?

- Dependency from Template to CSS
- Dependency from JS to CSS



Dependency from Templates

- Closure templates
- “requirecss” to declare dep to CSS

```
{template .navMenuButton requirecss="common.menubutton"}
```

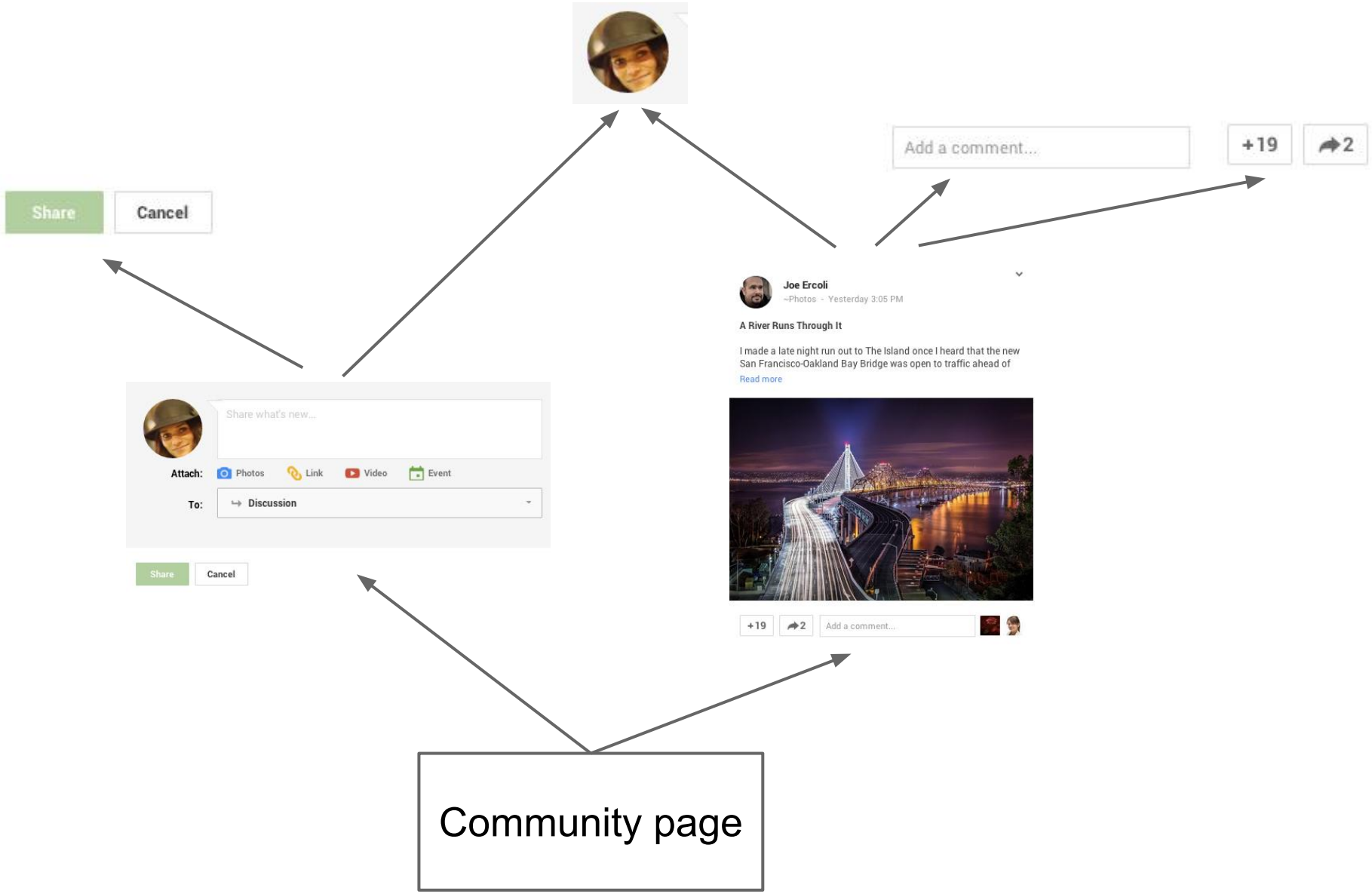
Dependency from Javascript

- “requirecss” to express dep from JS to CSS

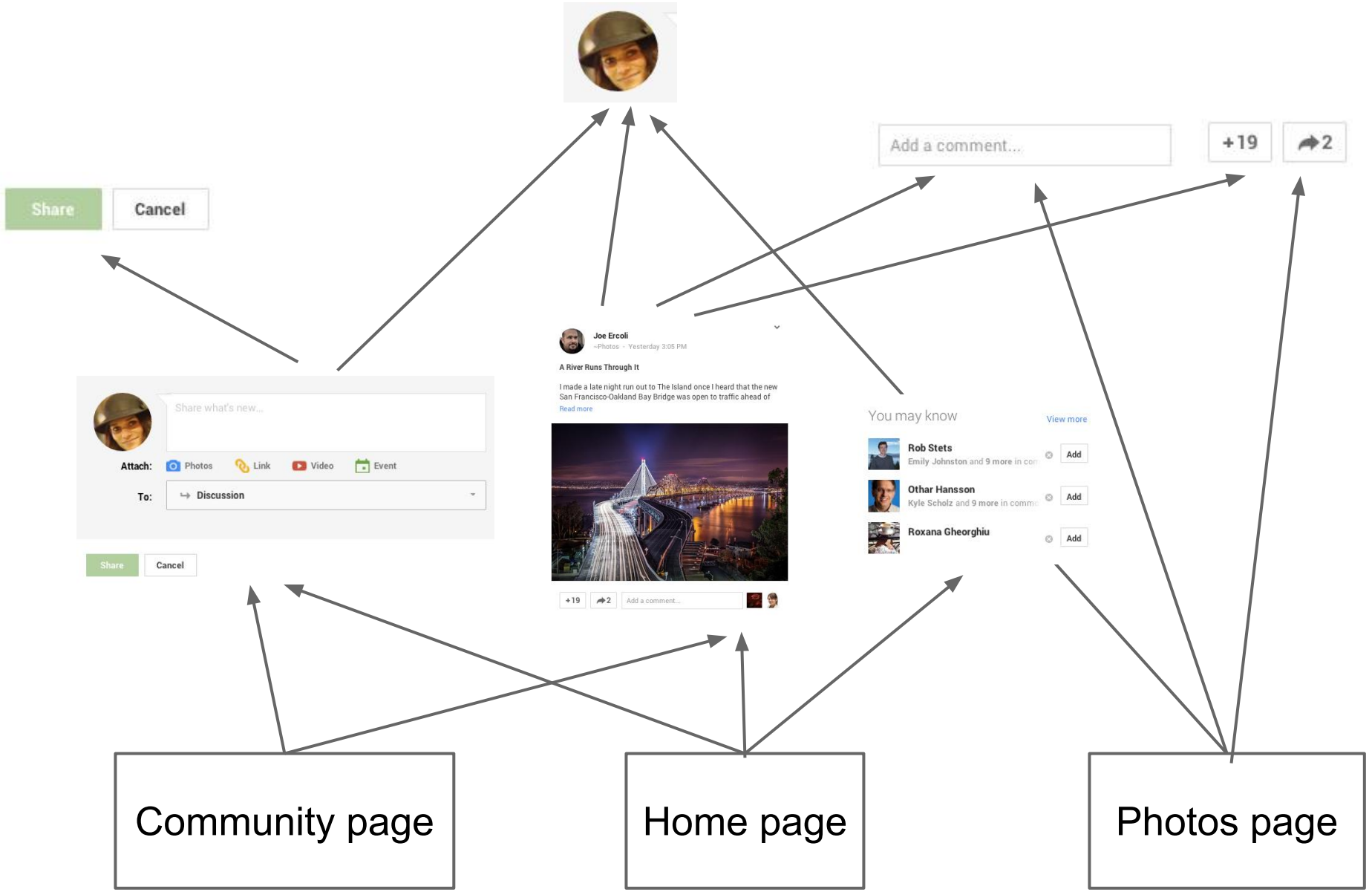
```
/**
 * @requirecss {common.menubutton}
 */
```

- Works with AMD syntax

Component dependency graph



Site wide component dep graph



II. Constants & Mixins

- Fonts, colors ...
- Syntax
  - @import in SASS
  - @provide / @require in

@provide / @require

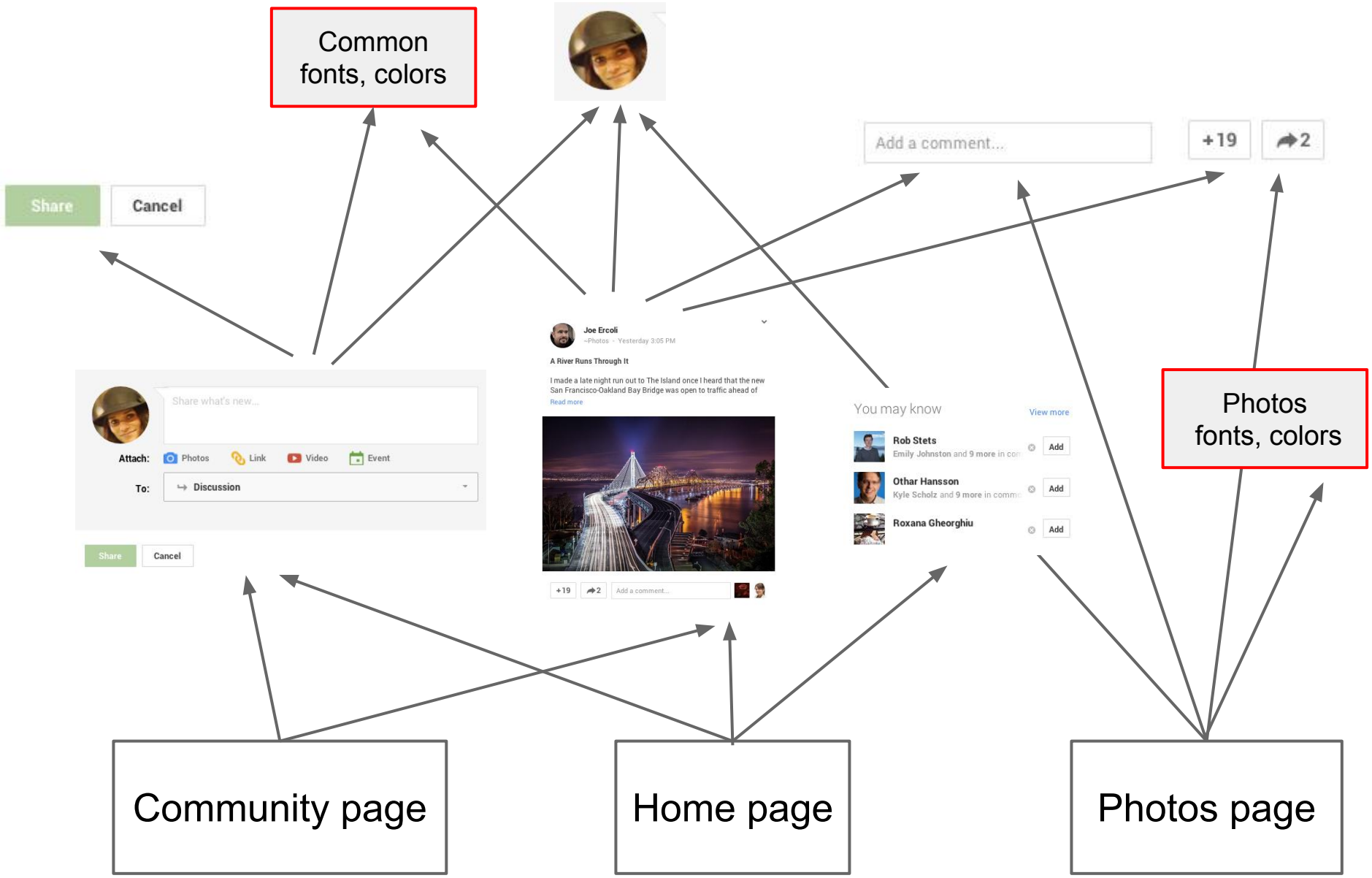
```
@provide 'profile.base';
@require 'common.base';

@def PROFILE_UPDATE_BG_COLOR    #f9edbe;
@def PROFILE_IMAGE_SIZE         48px;
…
```

```
@provide 'profile.post';
@require profile.base';

.postItem {
    background-color: PROFILE_UPDATE_BG_COLOR;
}
```

Constants added to CSS dep graph



That still leaves common CSS libraries …
but we’ll come back to that.

Challenge #2

Safely compose CSS in browser

CSS 101

- ‘C’ for Cascade - order dependent
  - Base styles precede overrides
- Specificity can trump cascade order

Cascade order dictates styles - not HTML

HTML:

```
<div class=”blue red”>
 Hello World
</div>
```

CSS:

```
.red {
  color: red;
}
.blue {
  color: blue;
}
```

Hello World

Also CSS Specificity dictates styles

HTML:

```
<div class="blue red hello">
  Hello World
</div>
```

CSS:

```
.hello.red {
  color: red;
}
.blue {
  color: blue;
}
```

Hello World

Use the cascade to dictate styles.

Not specificity.

Known Wisdom - OOCSS

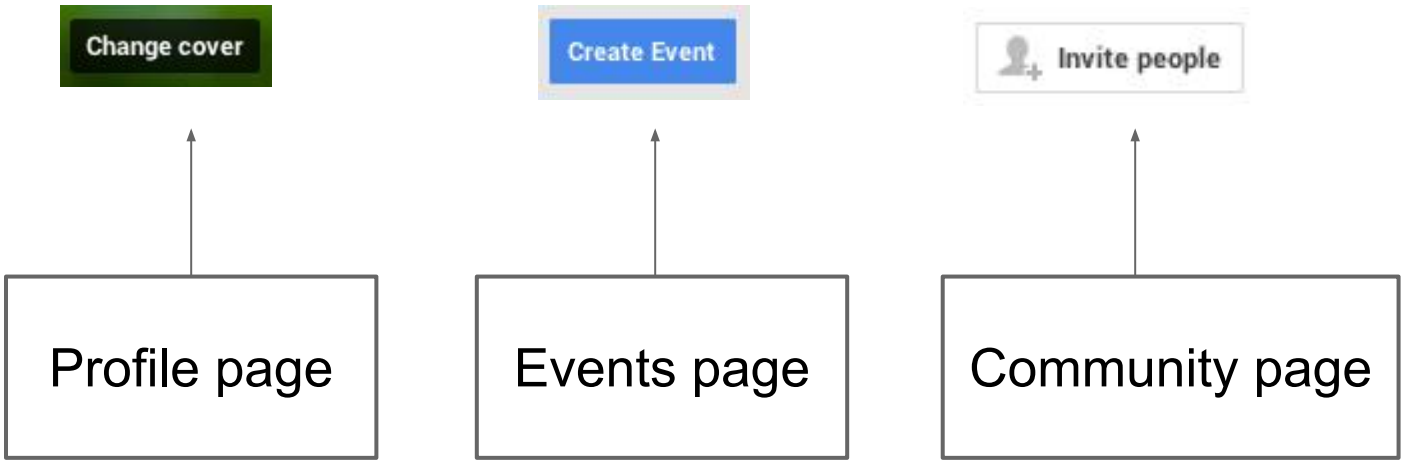
- Minimize selectors. Reuse.
- Simplify specificity
  - Keep specificity as low as possible
- Give rules the same strength
  - Use *cascade order* to override previous styles

Requirements

Want a framework that enables

- Simple selectors
- Rules of equal strength
- Cascade automatically ordered correctly
- Never worry about specificity

Overrides for a button



Strategies For Overriding Styles

- Compound selectors
- Descendant selectors
- Mixin semantics
- SASS @extend semantics
- Simple additional classes

Each has its pros & cons.

Most programmers would write this ...

Extend .standardButton with another class

```
<div role=”button” class=”standardButton ProfileButton”>
 Change Cover
</div>
```

```
<div role=”button” class=”standardButton EventButton”>
 Create Event
</div>
```

```
<div role=”button” class=”standardButton CommunityButton”>
 Add to circle
</div>
```

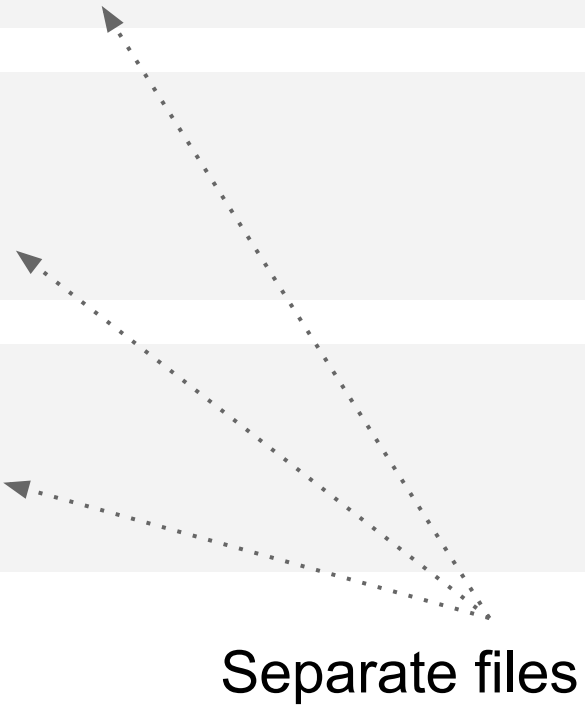
with this ...

Compound selectors

```
.standardButton {
  display: block; padding: 10px; background-color: white;
}
```

```
.ProfileButton.standardButton {
  background-color: black;
}
```

```
.EventButton.standardButton {
  background-color: blue;
}
```



Prone to specificity clashes.

Some may write ...

Descendant selectors

```
.standardButton {
  display: block; padding: 10px; background-color: white;
}
```

```
.ProfilePost .standardButton {
  background-color: black;
}
```

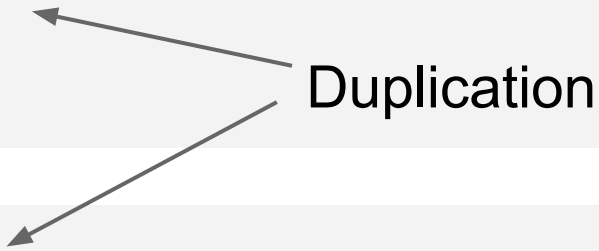
```
.EventPost .standardButton {
  background-color: blue;
}
```

Tied to HTML structure.

Tools would give you this …

Mixin semantics

```
.ProfileButton {
  display: block; padding: 10px; background-color: white;
  background-color: black;
}
```




```
.EventButton {
  display: block; padding: 10px; background-color: white;
  background-color: blue;
}
```

Or this ...

SASS @extend & placeholder selector

```
%standardButton {
  display: block; padding: 10px; background-color: white;
}
```

```
.ProfileButton {
  @extend %standardButton;
  background-color: black;
}
```

```
.EventButton {
  @extend %standardButton;
  background-color: blue;
 }
```

...

...

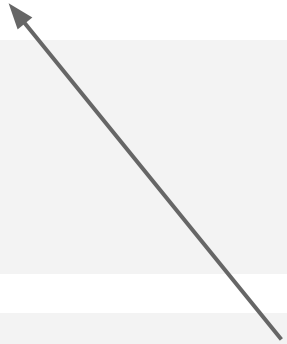
@extend compiles to ...

```
.ProfileButton, .EventButton, .CommunityButton {
  display: block; padding: 10px; background-color: white;
}
```

```
.ProfileButton {
  background-color: black;
}
```

```
.EventButton {
  background-color: blue;
}
```

```
.CommunityButton {
  background-color: grey;
}
```



Feature specific selectors in shared module in dep graph

What if you could just write this ...

Additional classes

```
.standardButton {
  display: block; padding: 10px; background-color: white;
}
```

```
.ProfileButton {
  background-color: black;
}
```

```
.EventButton {
  background-color: blue;
}
```

```
.CommunityButton {
  background-color: grey;
}
```

And rely on correct cascade order.

Dictate cascade order with @require

```
@provide 'standardButton';
.standardButton {
  display: block; padding: 10px; background-color: white;
}
```

```
@require 'standardButton';
.ProfileButton {
  background-color: green;
}
```

```
@require 'standardButton';
.EventButton {
  background-color: green;
}
```

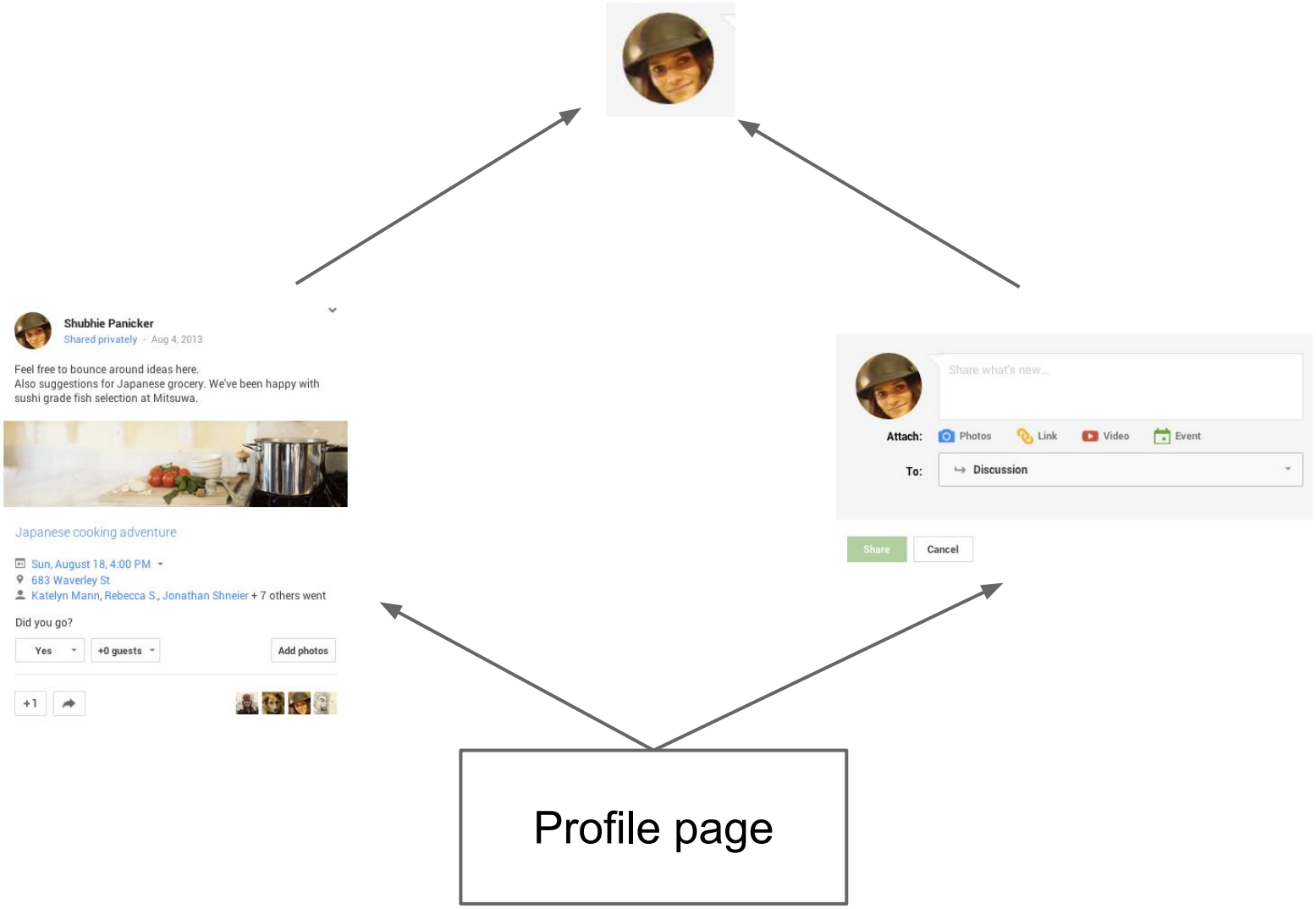
Dictate cascade order with @require

- Expand @require semantics for ordering
- Alternatives considered
  - Move ordering to JS and Templates
  - Alternative syntax
- Meets requirements
  - Minimize selectors
  - Rules of equal strength

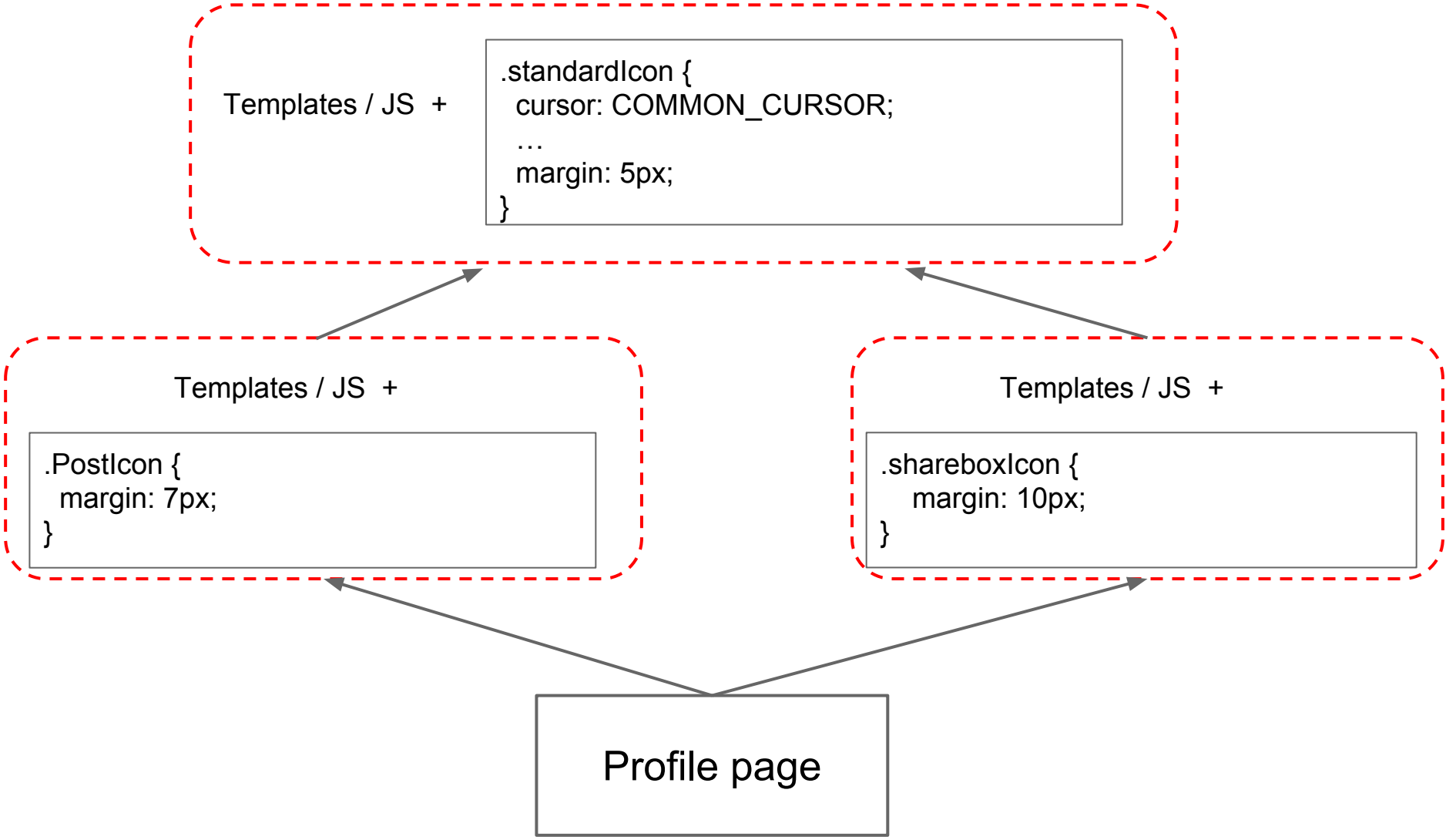
What about style overrides for components ?

Firstly, depending on shared components already guarantees correct cascade order!

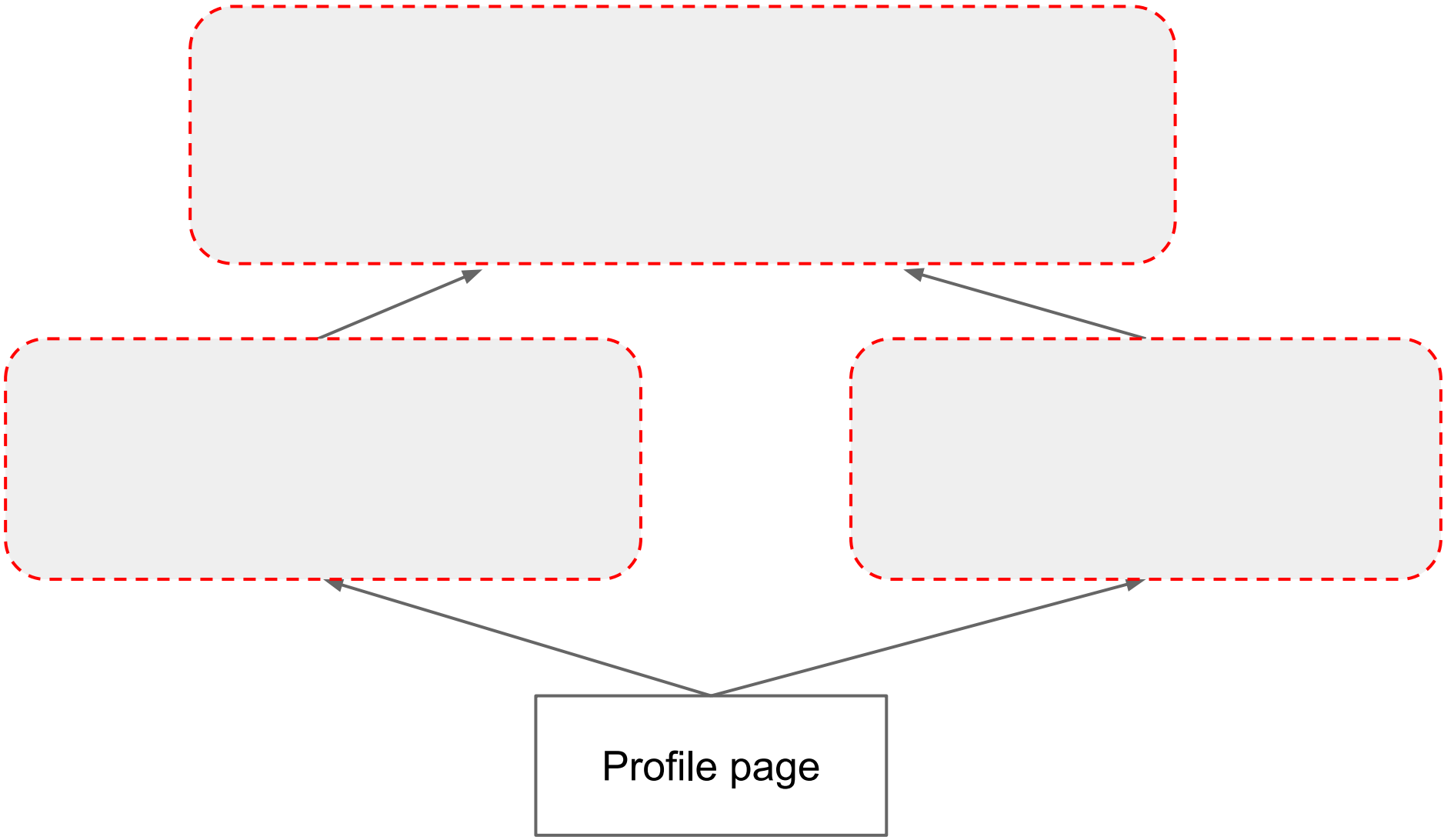
Many widgets want the icon



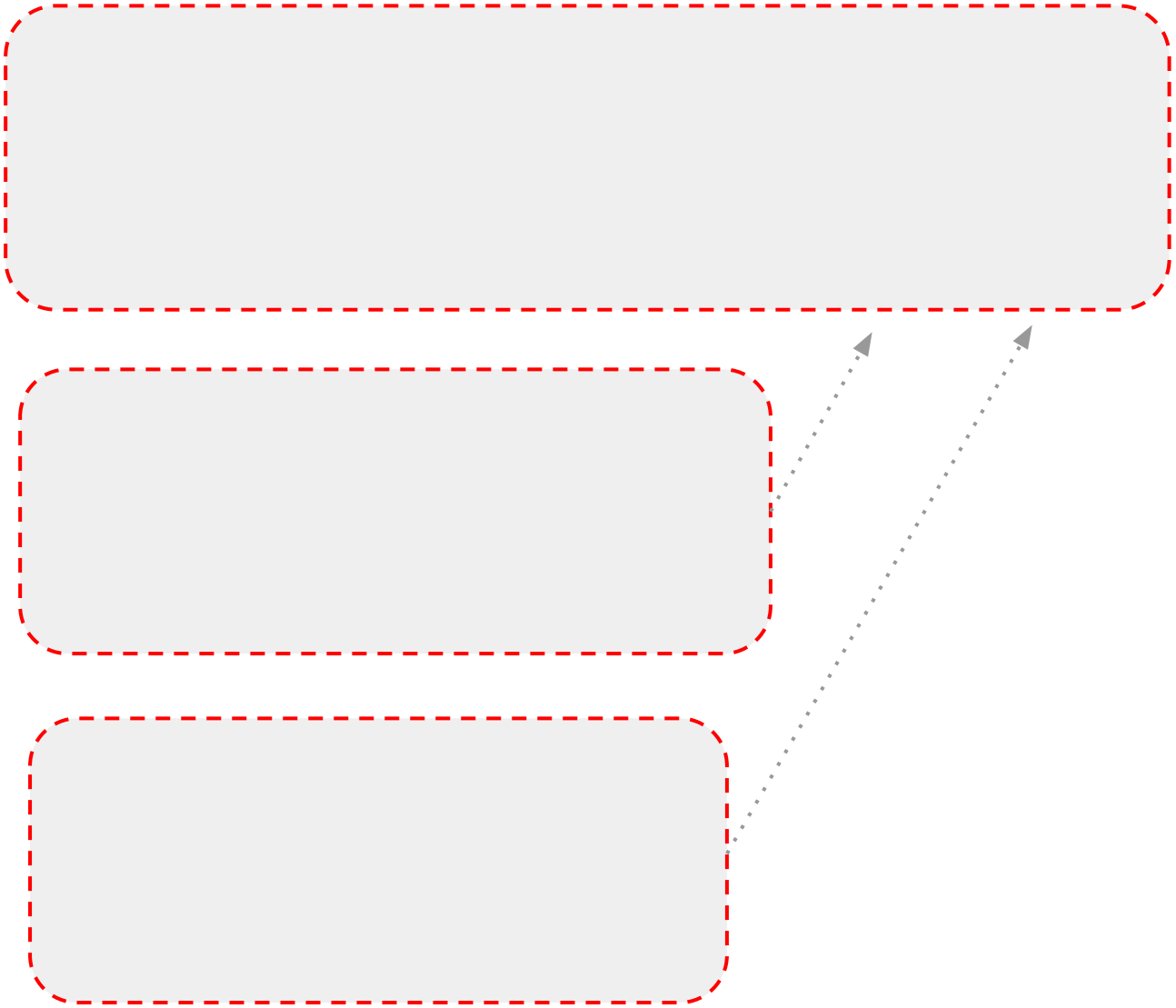
Component Dependency Graph



Component Dependency Graph



Flatten to cascade. Preserves order.



Framework creates correct cascade order from graph

```
.standardIcon {
  cursor: COMMON_CURSOR;
  …
  margin: 5px;
}
…
…


.postIcon {
  margin: 7px;
}
…
…


.shareboxIcon {
  margin: 10px;
}
…
…
```

How to override styles of a shared component ?

- Firstly, correct order with dep graph
- Add additional classes
  - Plumb class into component's template
  - Prefered if component almost always needs overrides
- Descendant selectors
  - Tied to *context* not HTML structure

… Covered so far

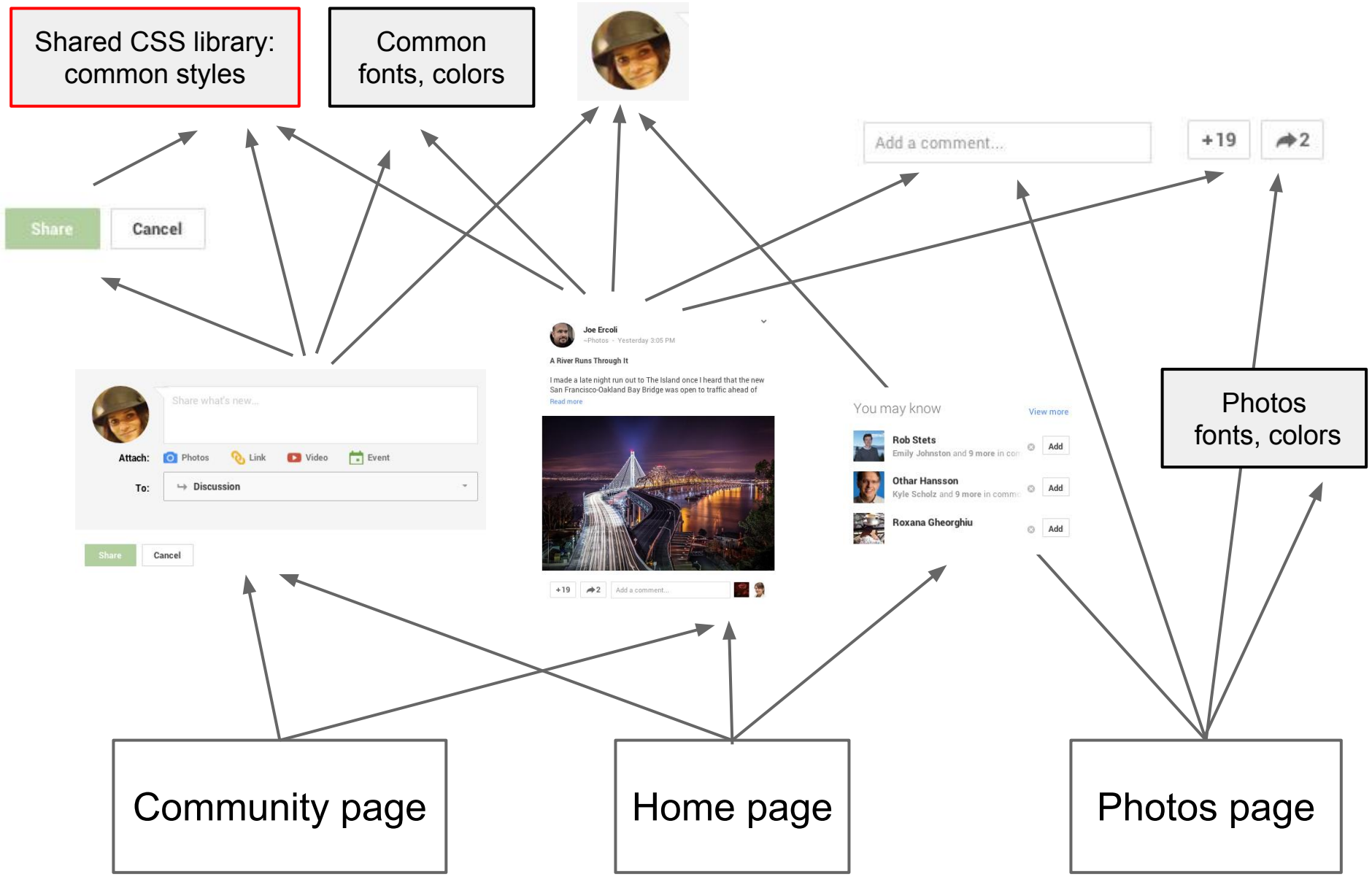
Types of CSS dependencies

- CSS from shared components
- Constants & Mixins
- CSS libraries

And

- Dependency syntax in each category
- Style overrides & cascade order

Complete CSS dep graph



Dependency Syntax is Enforced

Tools | Tests | Compiler passes

- requirecss
- @require
  - same selector overrides
  - ordering of classes in HTML

Module System

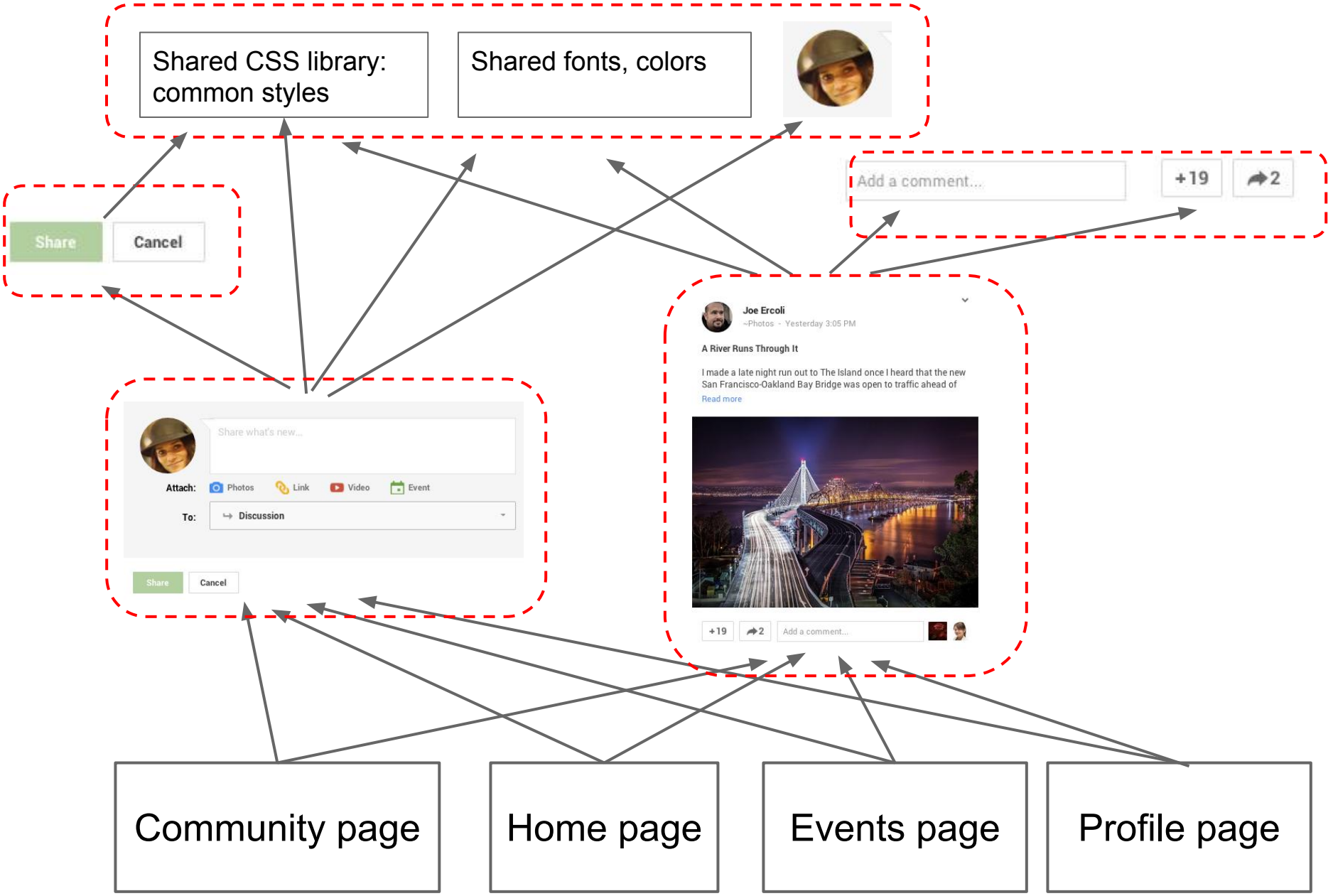
#1 Dependency System

- Namespaces
- Express dependency -- requirecss & @require

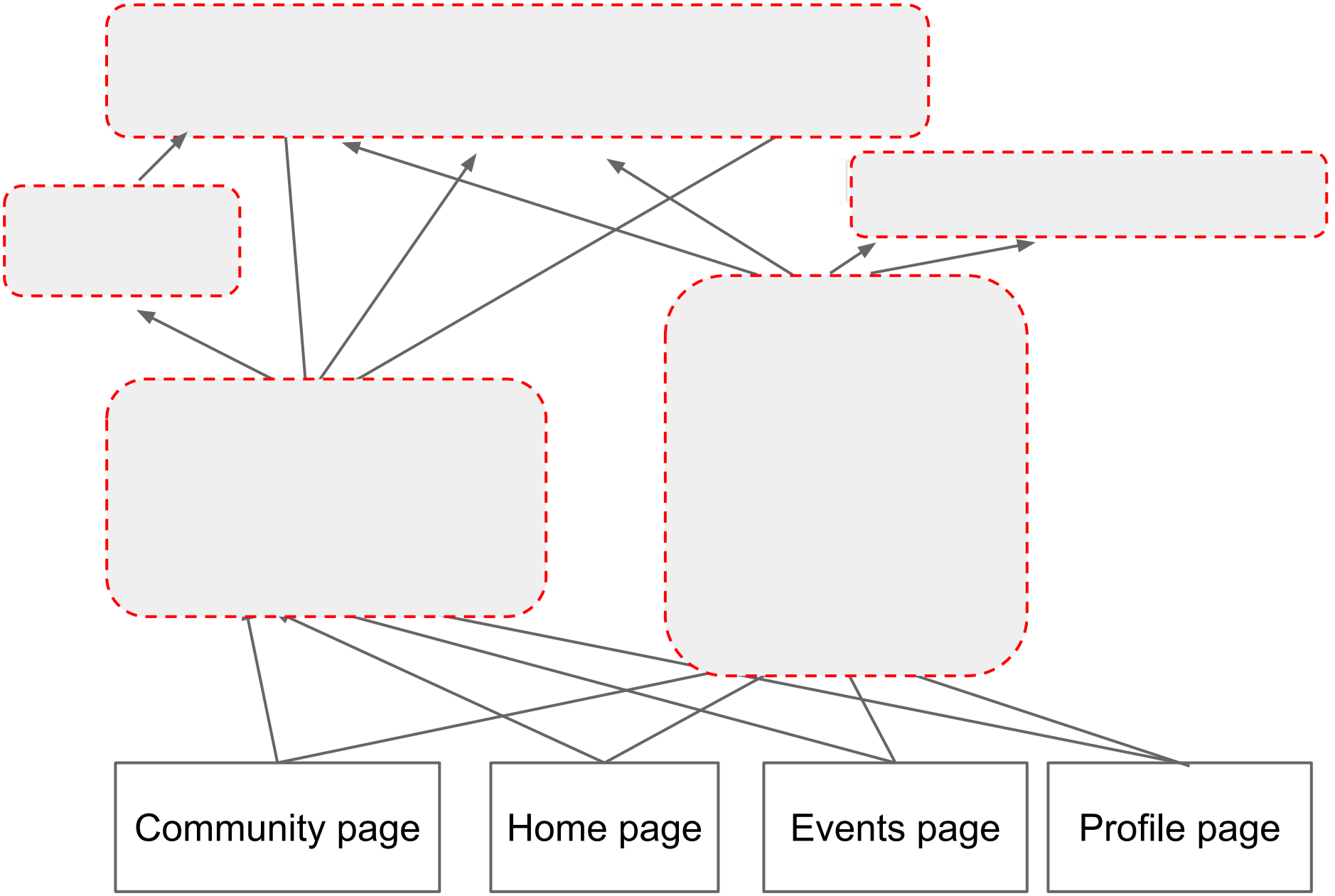
#2 Assembly & Serving system

Assembly & Serving System

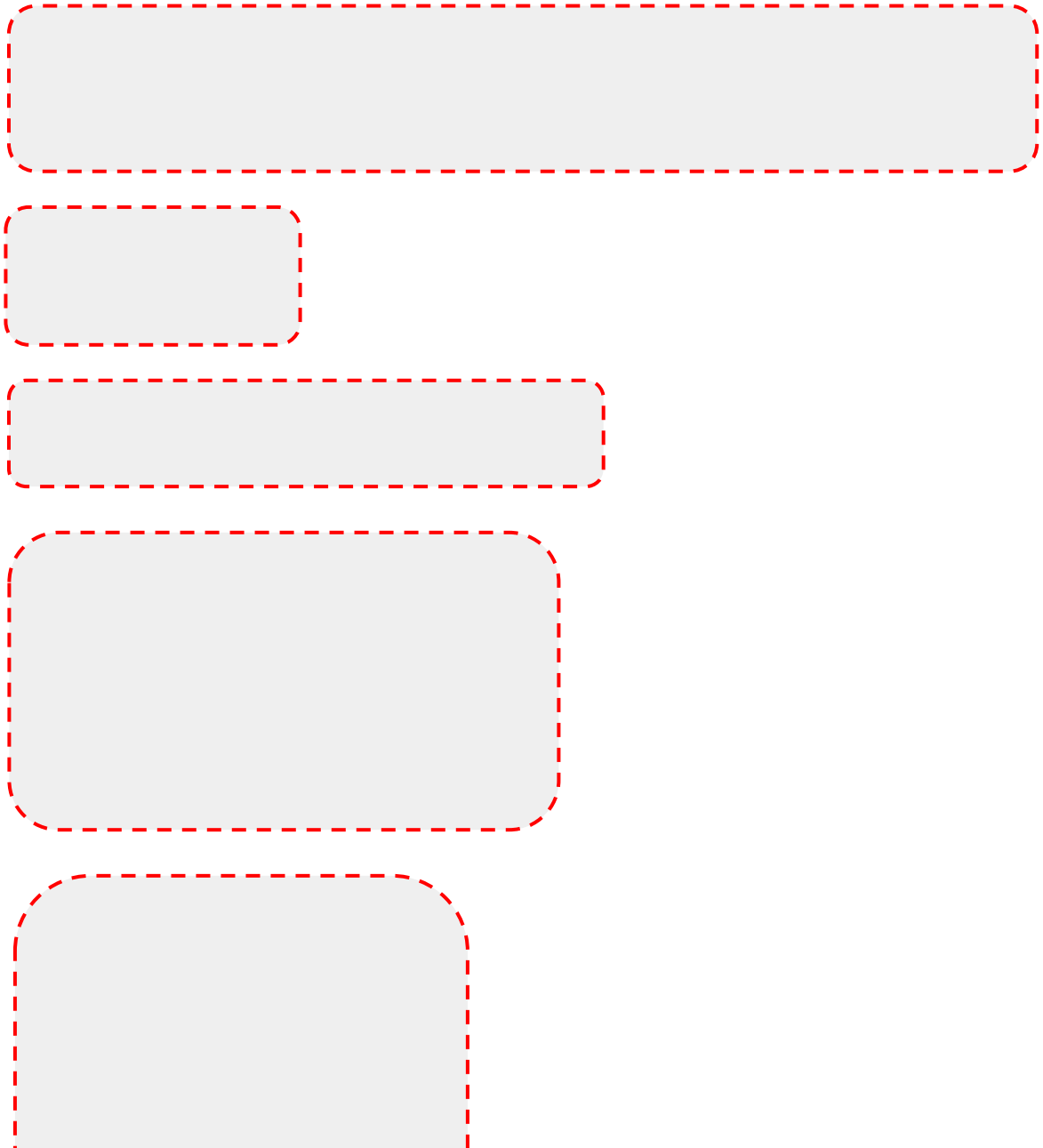
Assembly: Compile to Modules



Compile to Modules



Flatten to cascade. Preserve order.



Compilation

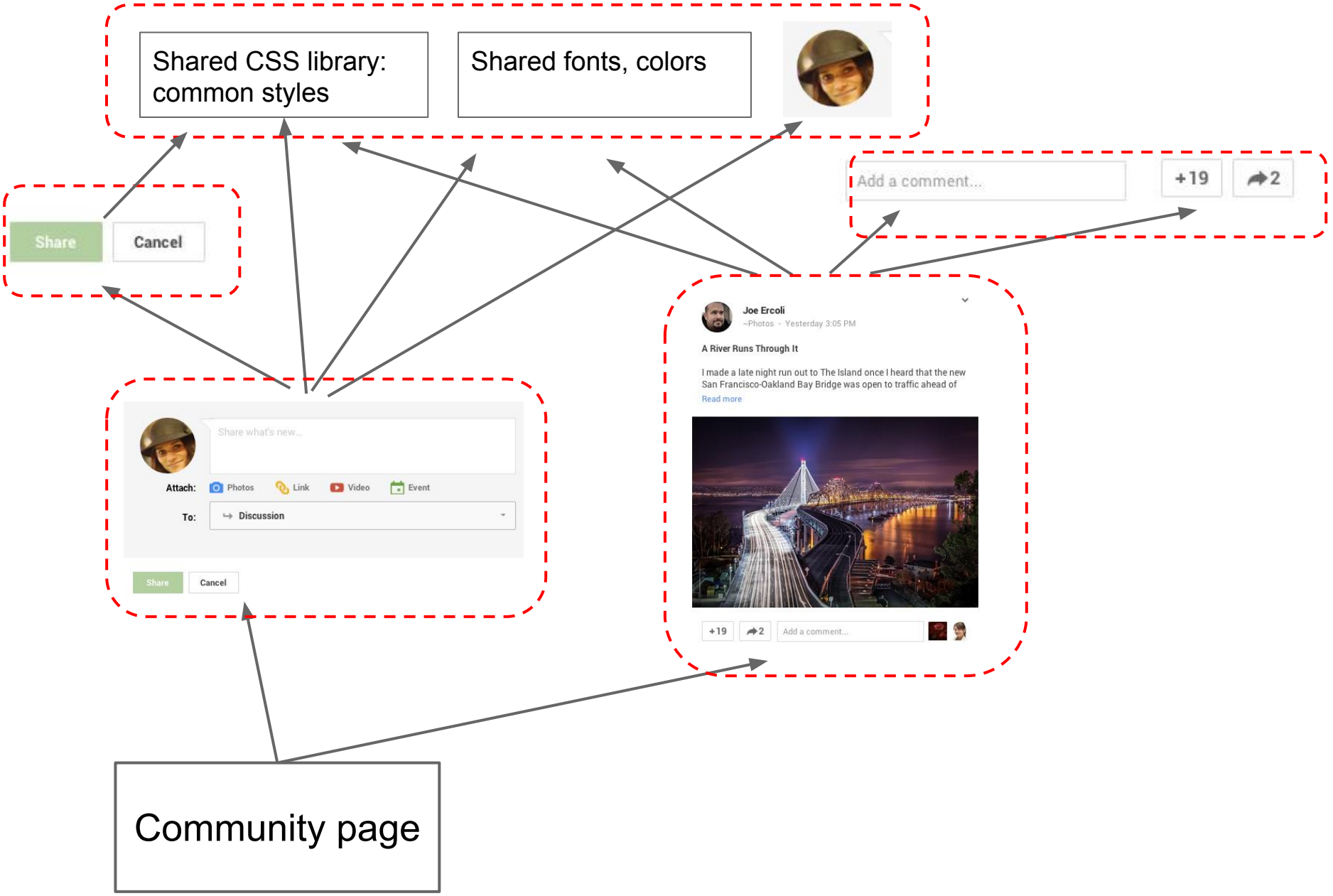
- Module
  - CSS grouping that is downloaded together
  - Shared deps downloaded with the first module that needs it
  - Analogous JS module
- Module-set
  - All the modules

Serving System

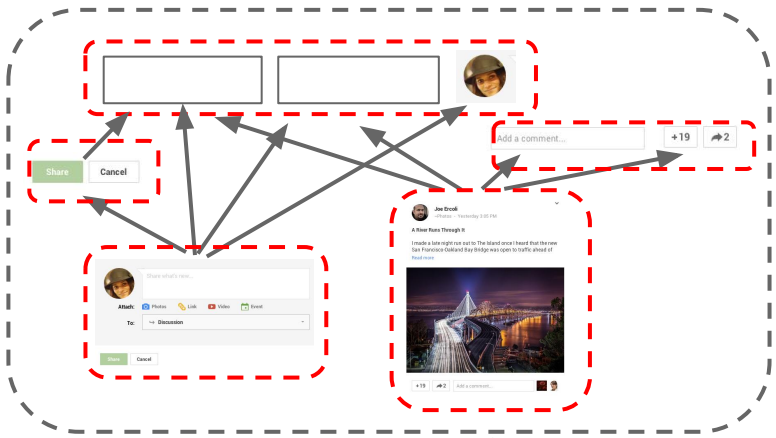
Requirements

- Minimize number of requests
- Cacheable responses

Client knows module deps



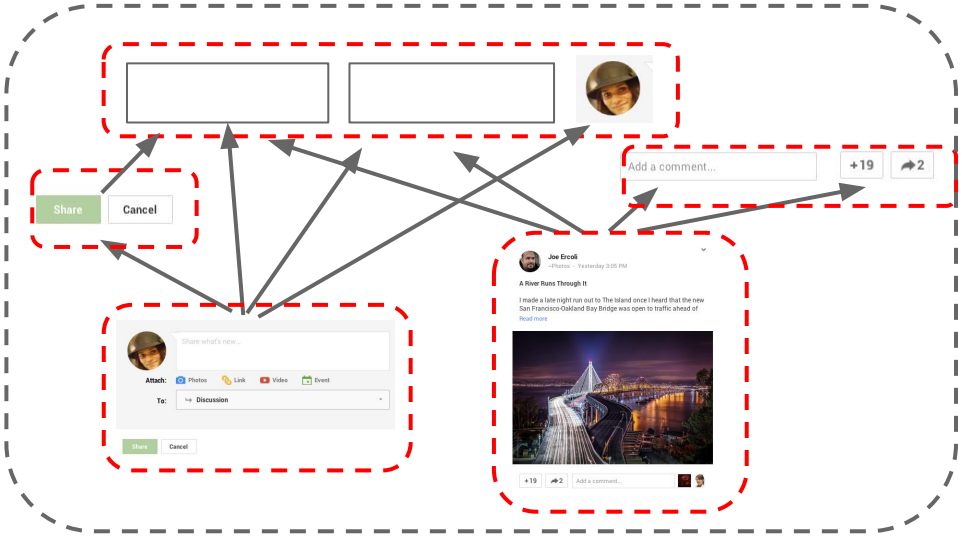
Single Request

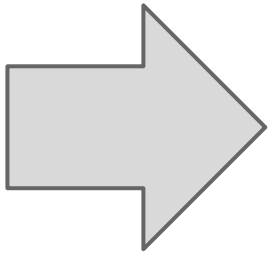


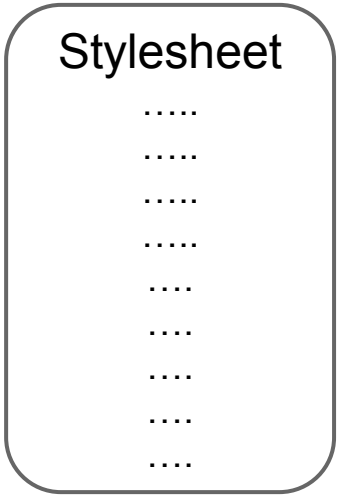
Request URL has list of modules

Server

Concatenated response

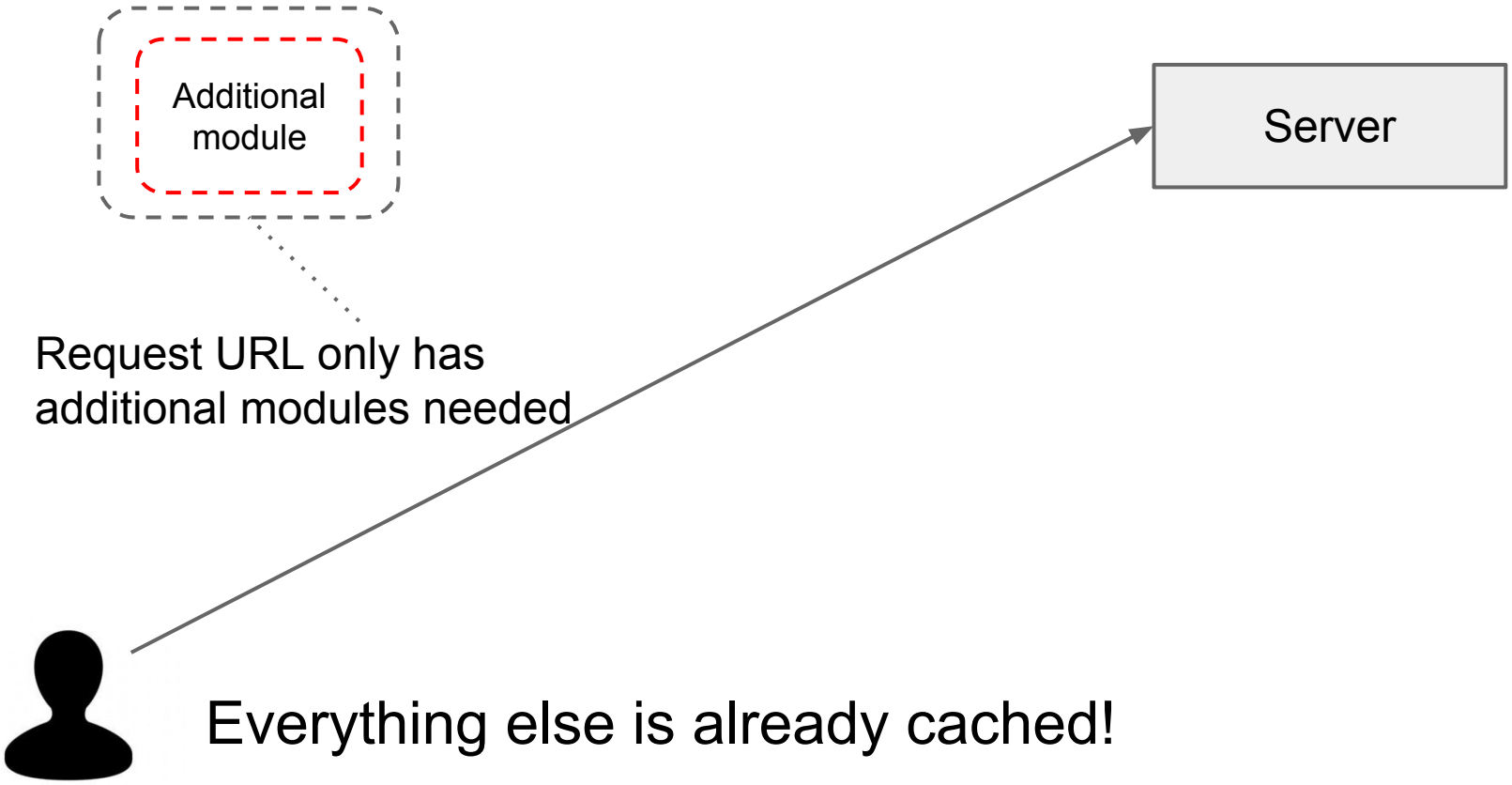




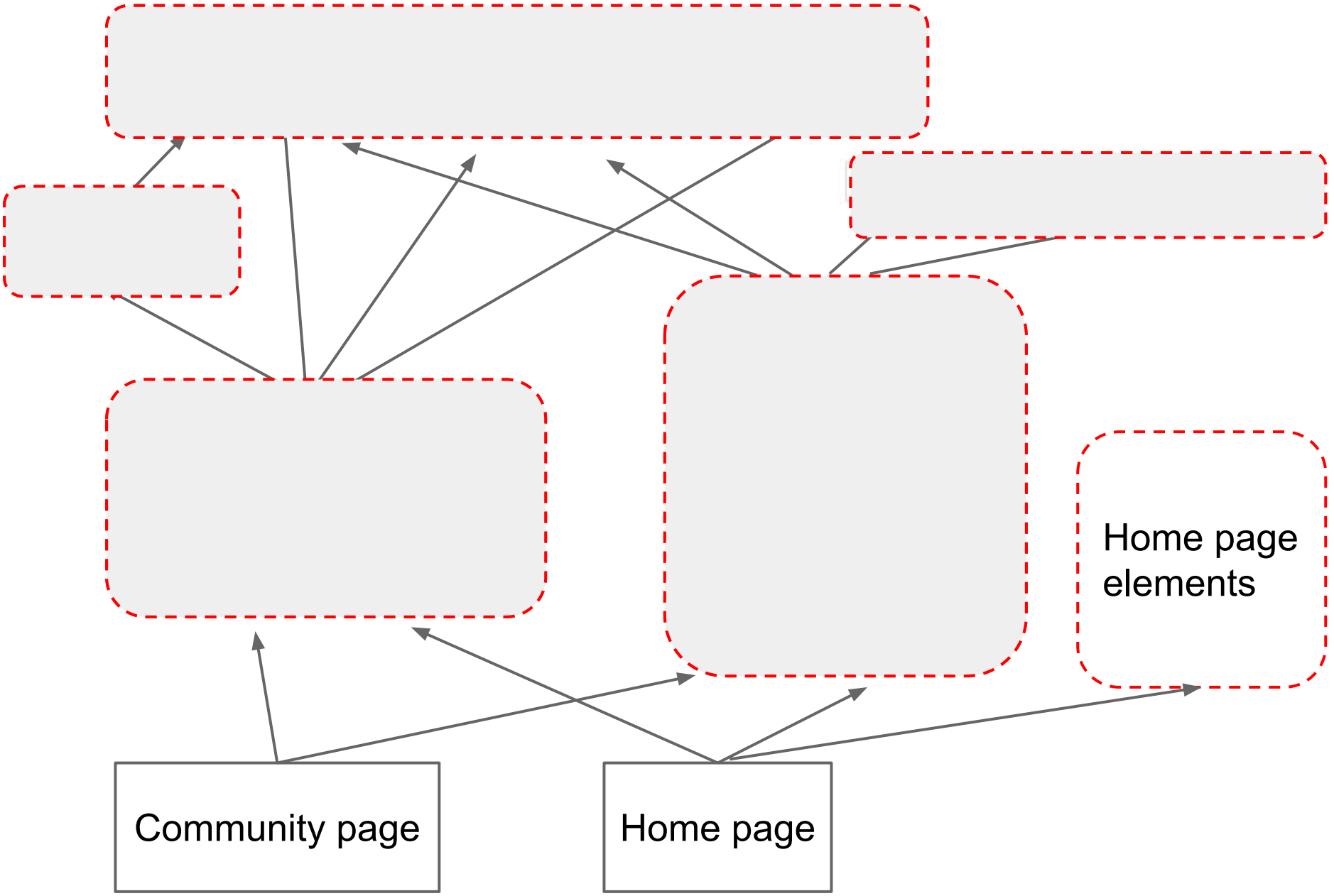


Server returns stylesheet

Next Request -- for next page



Dependency Graph Ensures Safety



Google+ Problems Addressed

- Initial bundle is too big and too slow
- Manually curated CSS is prone to reordering
  - Broken UI
  - Specificity wars

Open source Resources

- Closure Stylesheets
- Closure Templates

Thank You!

+Shubhie Panicker