how simplicity will save GIS

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how simplicity will save GIS
simplicity
GIS is hard
6.5 years building map apps
author and maintainer of Leaflet
by far the most used open source map library
still clueless about GIS
typical FOSS4G talk
clueless about GIS

exactly the reason why Leaflet succeeded
story recap

now with animated GIFs!
22 years old
so I’m doing maps now, how hard could this be?
maps huh?

- image tiles involved
- pan and zoom with a mouse
- maybe put some stuff on top
Lets build a JS API from scratch!
No
— don’t reinvent the wheel
— there’s a mature established open source solution
— let’s build a wrapper
OpenLayers

>100,000 lines of code?
hundreds of features?
megabytes of JavaScript?
BUILDING AN API WRAPPER
#osmdev: hey guys, what do you think about making a simple, lightweight OL alternative?
NO WAY YOU COULD DO THAT
WASTING TIME INSTEAD OF CONTRIBUTING
community: worthless idea

boss: don’t reinvent the wheel
oh wait
CHALLENGE ACCEPTED
building from scratch; didn’t tell anyone
a couple weeks later
I'M NOT EVEN SORRY
born as a protest against bloat, clutter and complexity
3 years later:
open source!
now
Suggestions for Top Picks

Show me places ...
- I haven't been to
- I have been to before
- My friends have been to
- With Foursquare specials

Баркас
8.7
ул. Володимирська, 49а
Seafood

Демократичная кухня предлагает лучшее из разнообразия колоритного крымского меню: черноморская рыба и морепродукты, сочное мясо и сыры... И, конечно же, Крымское вино! - Restorania

A new spot in the neighborhood

Aroma Espresso Bar
9.6
ул. Жилянская, 75
Coffee Shop - 1 here now

Прекрасное место для тех, кто работает ночью - Gloss.ua

Time for a coffee break?
Here Comes The Bromo Again
Igor Piłowski
7°19′38″S, 109°54′5″E
CIVIL AIR PATROL PHOTOS OF TORNADO DAMAGE IN MOORE, OKLA.

The map shows images captured by the Civil Air Patrol following the May 20 Moore, Okla., tornado. Markers show the location of the plane and number of photos taken from that spot. Zoom in to see detail and photos. Path colors indicate areas of higher intensity.
The Ritual Stone

The Ritual stone is East of Whiterun and West of Valthenheim Tower, just head East on the...
but how?
simplicity
thought process of an aspiring map app creator:
I want to learn GIS, reading books and academic papers and articles about geospatial data, map projections, server-side technologies, databases, different geospatial standards and protocols and their implementations in available range of server and client software, perform analysis of my data and use cases, preferably involving other GIS specialists and do a lot of other research so that I can make sensible decisions about the required technology stack, adjust it to the needs of my application and finally make a f**king map (maybe in a couple years).
I want a map right now
get the tech out of my way
application development is a creative process
technology should **bridge** the gap between **creative thinking** and the **end result**
I believe this passionately: that we don’t grow into creativity, we grow out of it. Or rather, we get educated out if it.
you must unlearn what you have learned
let me create, explore, experiment, and learn along the way
we spend so many years learning things before we get the chance to understand how to apply our knowledge
creative learning:

create

learn
“The true sign of intelligence is not knowledge but imagination.”

—Albert Einstein
dead simple to get started
dead simple to understand
dead simple to use
convention over configuration:

don’t force me to think about unimportant things until I’m ready to address them
complexity fills your mind, makes it slow and inert, it dumbs you down
simplicity frees your mind, unleashes your creativity and learning potential
simplicity enables you to do more with less
decision process of a company that’s looking to add a map to their service:
so lets hire a GIS consulting firm to do some research for us and choose the right technology stack and then help us set it up and consult our developers so that they could get more familiar with it and maybe also buy some enterprise support plan and…
hey front-end guy!
make a map!
the most successful tech companies have the **tinkerer culture**
creative + productive + happy
=> awesome apps
lots of awesome apps

=> community growth & tech exposure
simplicity attracts a vibrant community
simplicity means focus on the essentials, which leads to higher quality
“Simplicity is prerequisite for reliability.”

—Edsger Dijkstra
thou shalt not try to cover all the use cases
HOW STANDARDS PROLIFERATE:
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC)

SITUATION:
THERE ARE 14 COMPETING STANDARDS.

14?! RIDICULOUS!
WE NEED TO DEVELOP ONE UNIVERSAL STANDARD THAT COVERS EVERYONE'S USE CASES.

YEAH!

SOON:

SITUATION:
THERE ARE 15 COMPETING STANDARDS.
feature need

simplify

complexity
simplicity means easier profiling and less bottlenecks, which leads to better performance
<table>
<thead>
<tr>
<th>Test</th>
<th>RBush</th>
<th>old RTtree</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>insert 1M items one by one</td>
<td>6.18s</td>
<td>16.46s</td>
<td>2.7x</td>
</tr>
<tr>
<td>1000 searches of 0.01% area</td>
<td>0.07s</td>
<td>2.52s</td>
<td>35x</td>
</tr>
<tr>
<td>1000 searches of 1% area</td>
<td>0.53s</td>
<td>5.03s</td>
<td>9.6x</td>
</tr>
<tr>
<td>1000 searches of 10% area</td>
<td>2.45s</td>
<td>16.76s</td>
<td>6.8x</td>
</tr>
<tr>
<td>remove 1000 items one by one</td>
<td>0.03s</td>
<td>3.2s</td>
<td>118x</td>
</tr>
<tr>
<td>bulk-insert 1M items</td>
<td>1.99s</td>
<td>n/a</td>
<td>8.3x</td>
</tr>
</tbody>
</table>
simplify.js

73752 points, simplified with tolerance: 0.8 px
After simplification: 154 points (~479 times less)
Performed in 0.9 ms

The test data for the example is actually a ~10700 mile car route from Lisboa, Portugal to Singapore on a world scale, generated by the CloudMade Navigation service based on OpenStreetMap data.
seidel + earcut

OSM building (15 vertices):
- earcut $\times$ 707,439 ops/sec
- pnltri $\times$ 227,890
- seidel $\times$ 77,236
- poly2tri $\times$ 29,354
- libtess $\times$ 21,875

monkey (1204 vertices):
- seidel $\times$ 608
- libtess $\times$ 342
- poly2tri $\times$ 239
- earcut $\times$ 219
- pnltri $\times$ 112

dude shape (94 vertices):
- earcut $\times$ 33,620
- pnltri $\times$ 13,626
- seidel $\times$ 10,037
- libtess $\times$ 4,362
- poly2tri $\times$ 3,773
simplicity makes people less hesitant to contribute
simplicity makes it easier to concentrate
simplification is how the technological progress happens
hard problem
manageable problem
simple problem

harder problem
jQuery
Ruby on Rails
node.js
“Simplicity is the outcome of technical subtlety. It is the goal, not the starting point.”

—Maurice Saatchi
“oh but we’re not paid to do simple things!”
people who resist progress, unwilling to learn and adapt continuously, are in denial and always fail
you don’t think about simplicity when complexity is taken for granted
paradox of fitness: you don’t realize the benefits of regular exercise until you become more physically fit
simplicity is a muscle, it needs to be exercised consistently
lets make a collective conscious effort to simplify GIS technology
so that we can be happy and build more awesome stuff!