

Norwegian Meteorological Institute

Experiments on Splitting User Interface and Data Handling in Diana

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Digital Analysis

- meteorological workstation software
 - MET Norway, SMHI, ...
 - forecasters + researchers
 - GUI and batch versions
 - perl interface
- implemented using C++ + Qt
- open source:
 github.com/metno/diana
- connected to other forecaster applications via network protocol
 - ted, modfly, mimage, ...



Handling huge model outputs

- model size is continuously increasing
- · forecasters cannot wait
 - pilots or journalists want answers now
 - efficiency has to increase
 - waiting is boring and annoying

Today, everything is remote

- complete diana application runs remotely on dedicated servers
 - VirtualGL + ssh
 - slow startup, big latency for GUI elements
 - difficult integration (sound, printers, "disk")
 - everything breaks when the ssh tunnel breaks
 - it can hang because of network, io, bug



Partly local, partly remote?

- · idea: split
 - GUI local
 - data servers (possibly) remote
- many possible server configurations
 - several servers, one per model?
 - caching proxies, selecting fast / alive upstream server

Dublin

Birmingham

London

Helsinki

Tallinn

Riga

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Минск

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København

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Hamburg

Amsterdam

Санкт Петер

- ..
- one server handles multiple users
 - better caching
 - fewer reprojection calculations

Why not WMS / WPS / ...?

- \cdot typical use
 - either known model + reference time + field + style
 - or step by step model, reference time, field, style
- · WMS: huge capabilities document
 - 50 models
 - each has 20 reference times
 - each has 50 fields
 - (each field has 50 style options)
 - 50000 layers
 - how often to reload?
- · WPS: maybe, later
- possibility for WMS/WPS frontends
- · evolution not revolution, for now
 - stay close to current implementation for the experiment

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All beginnings are difficult

- · Diana is not "new" (born 1999 or earlier)
- · lots of good stuff
- · lots of mixed responsibilities
- lots of preparations before starting splitting-ui-and-data experiment
 - even if the experiment fails, this is good

data

GUI

Experiments so far

- · restricted to model data (FIELD)
- · one client, multiple servers
 - serving data or images
- fetching data / images in multiple threads
- some challenges
 - requirements: "as now or similar in every detail"
 - lack of tests
 - multi-threading problems
- based on GRPC simple, but not good for our purpose



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Preliminary results

- · it works, somehow and sometimes, surprisingly
- display size is also increasing continuously
 - 2kx2k pixel ARGB32 image = 16MB
 - · 0.16s on a 100MB/s network
 - might be smaller or larger than model
 - 1 field might need several images, one per layer
 - 1 field needs data only once
- \cdot some things are slow
 - 30ms or more to compress image to PNG
 - 24ms latency Oslo Tromsø (good conditions)

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- must fetch in parallel, without roundtrips
- very slow but still functional over 200kB/s
 VPN WLAN Oslo Tromsø Oslo

Side effects & future

- · possibility for different clients
 - WMS server might use diana data servers as backend
 - lightweight client might offer a simplified user interface
- · possibility for different servers
 - servers in multiple data centers
 - servers coming and going
 - serve from data center until model results are copied, then switch to "local" server
 - servers in other languages than C++
 - servers doing some processing
- \cdot diana application does not die if the network is slow or broken
- · need to solve some issues before testing
- \cdot need to evaluate possible optimisations