EGU Vienna 2015

Supervising simulations with the Prodiguer Messaging Platform

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CONVERGENCE

Big Data and Exascale challenges
for Climate Sciences

http://convergence.ipsl.fr

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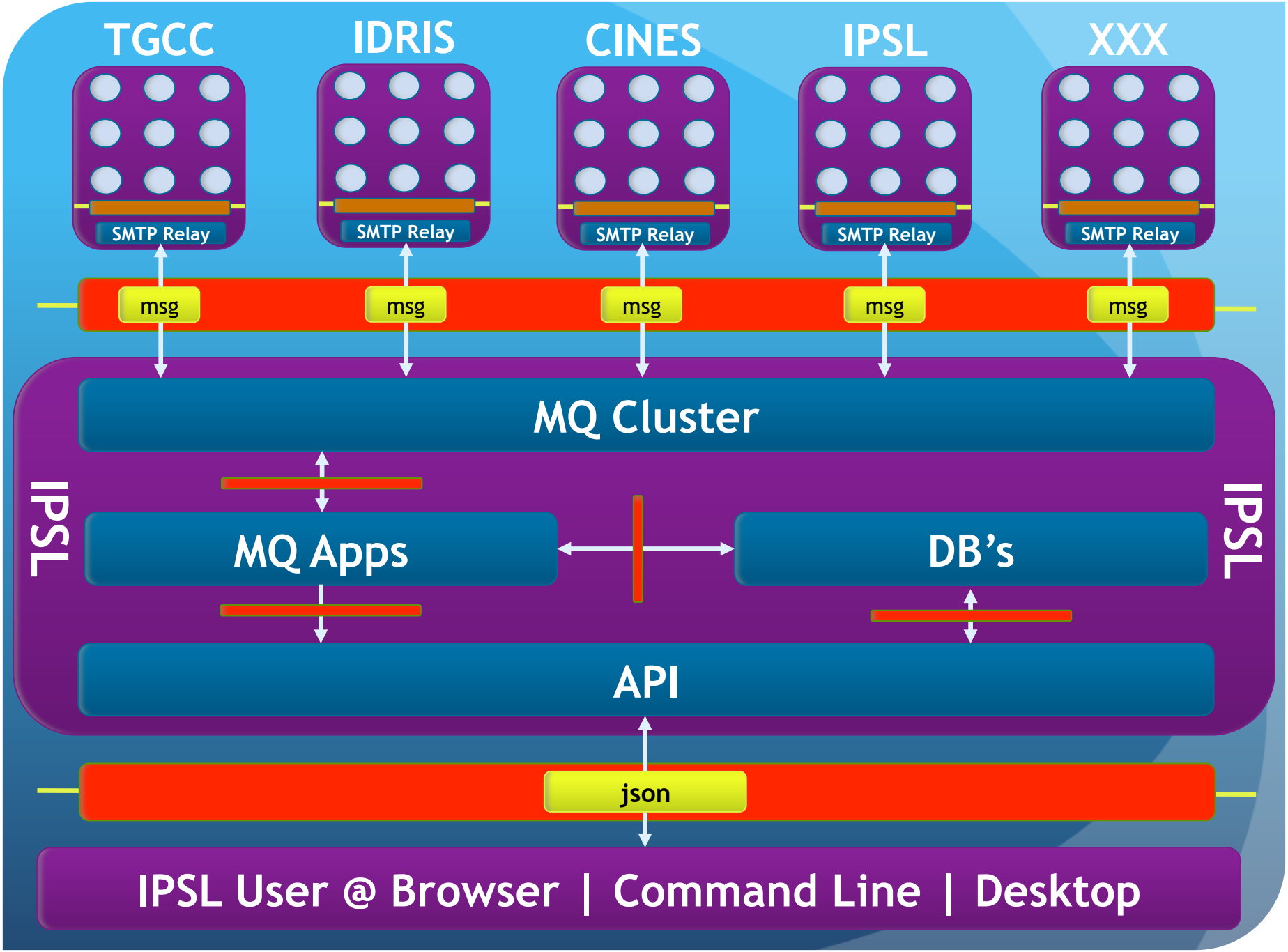
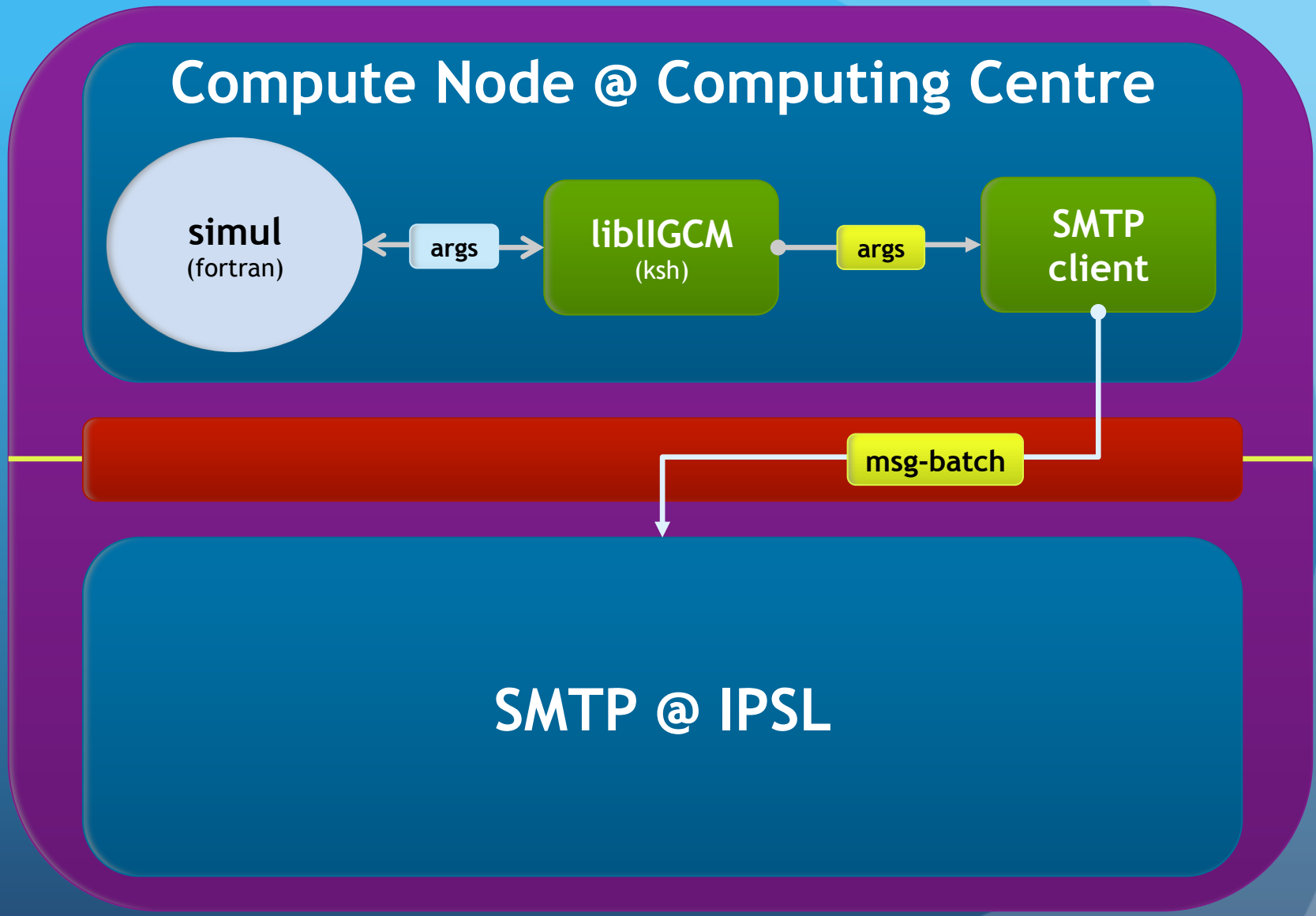
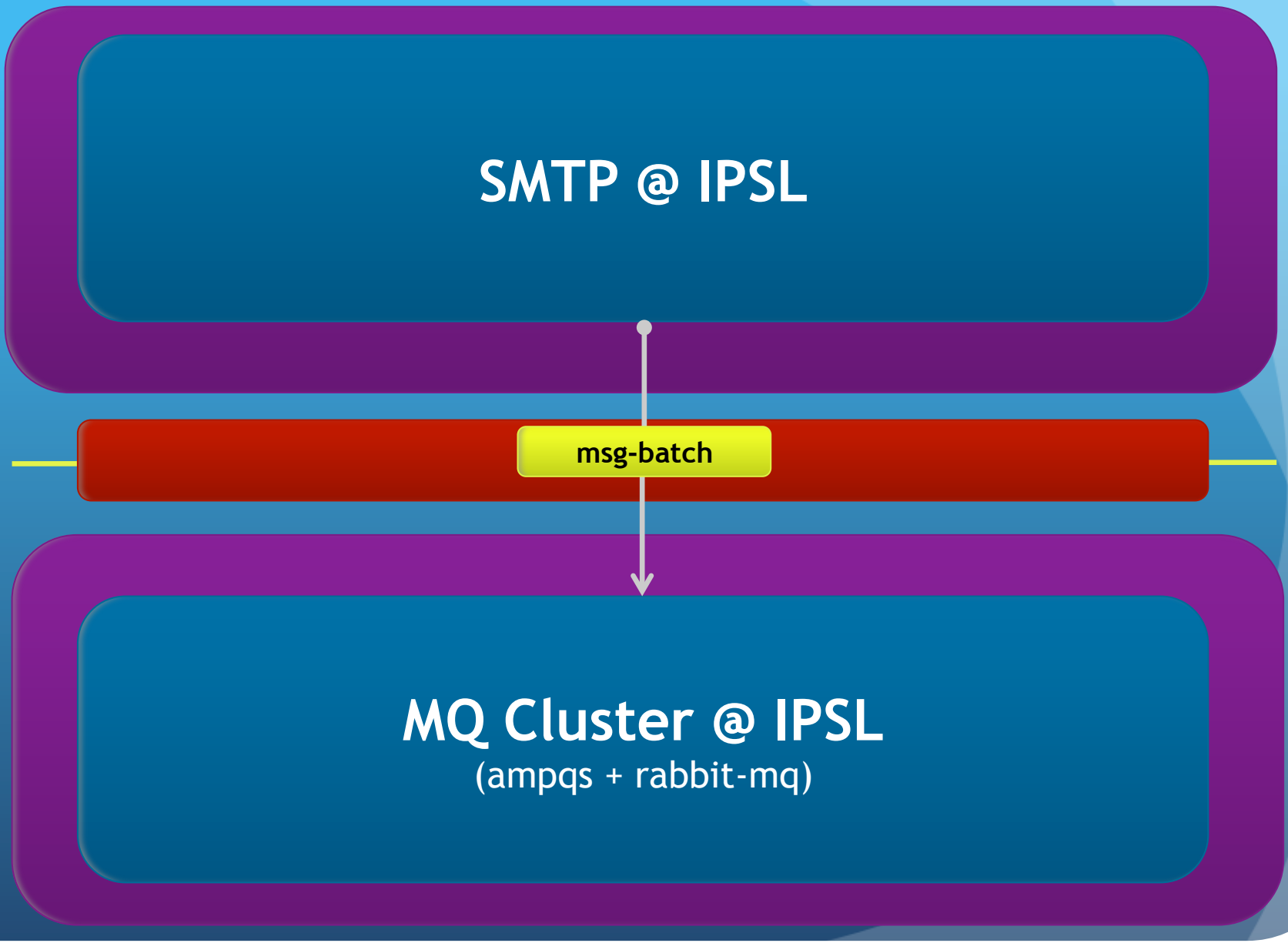
Message Flow


TGCC
IDRIS
CINES
IPSL
XXX
SMTP Relay
SMTP Relay
SMTP Relay
SMTP Relay
SMTP Relay
msg
msg
msg
msg
msg
MQ Cluster
IPSL
MQ Apps
DB's
IPSL
API
json
IPSL User @ Browser | Command Line | Desktop

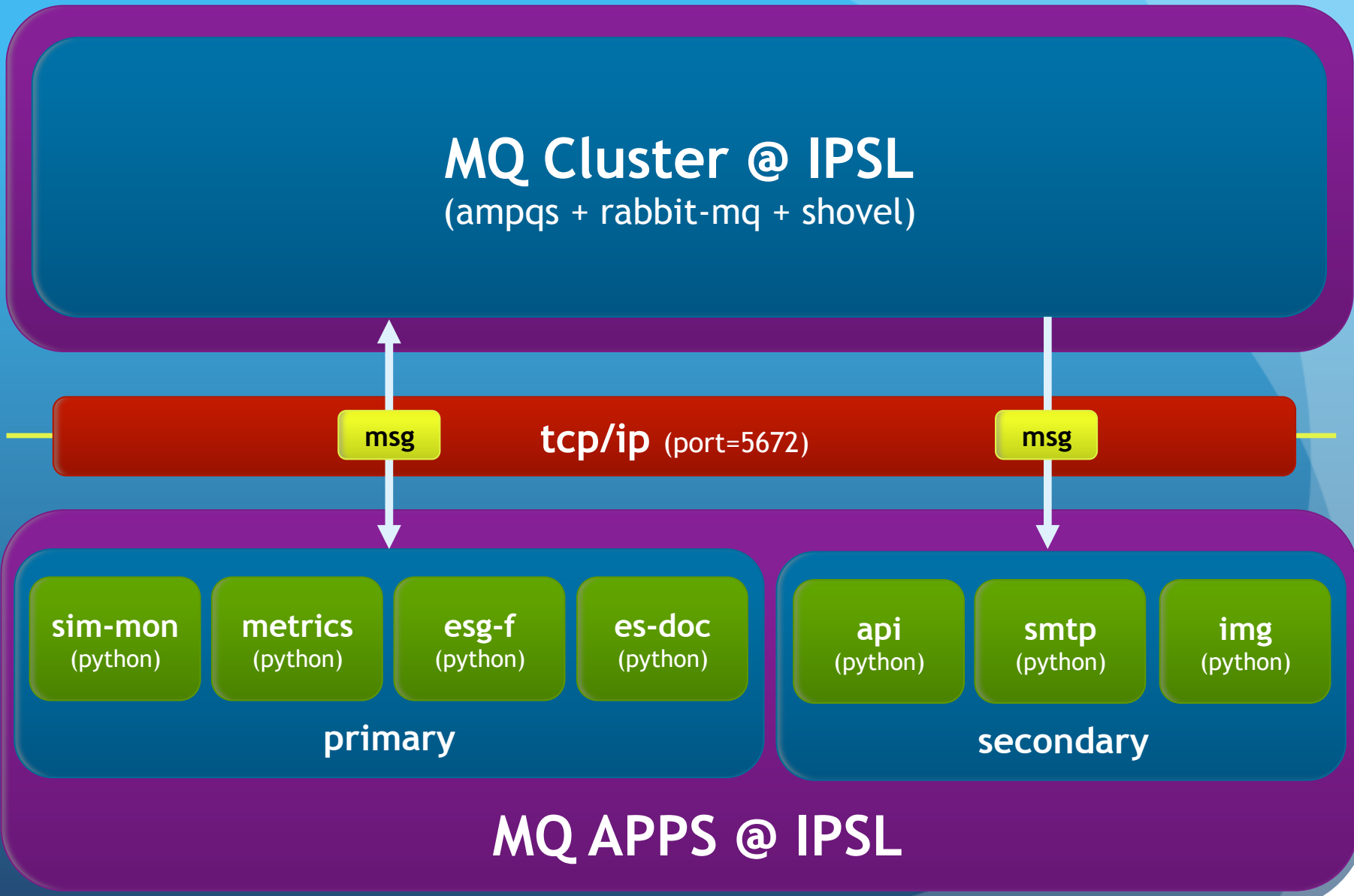
Flow 1: CC.NODE ---> IPSL.SMTP



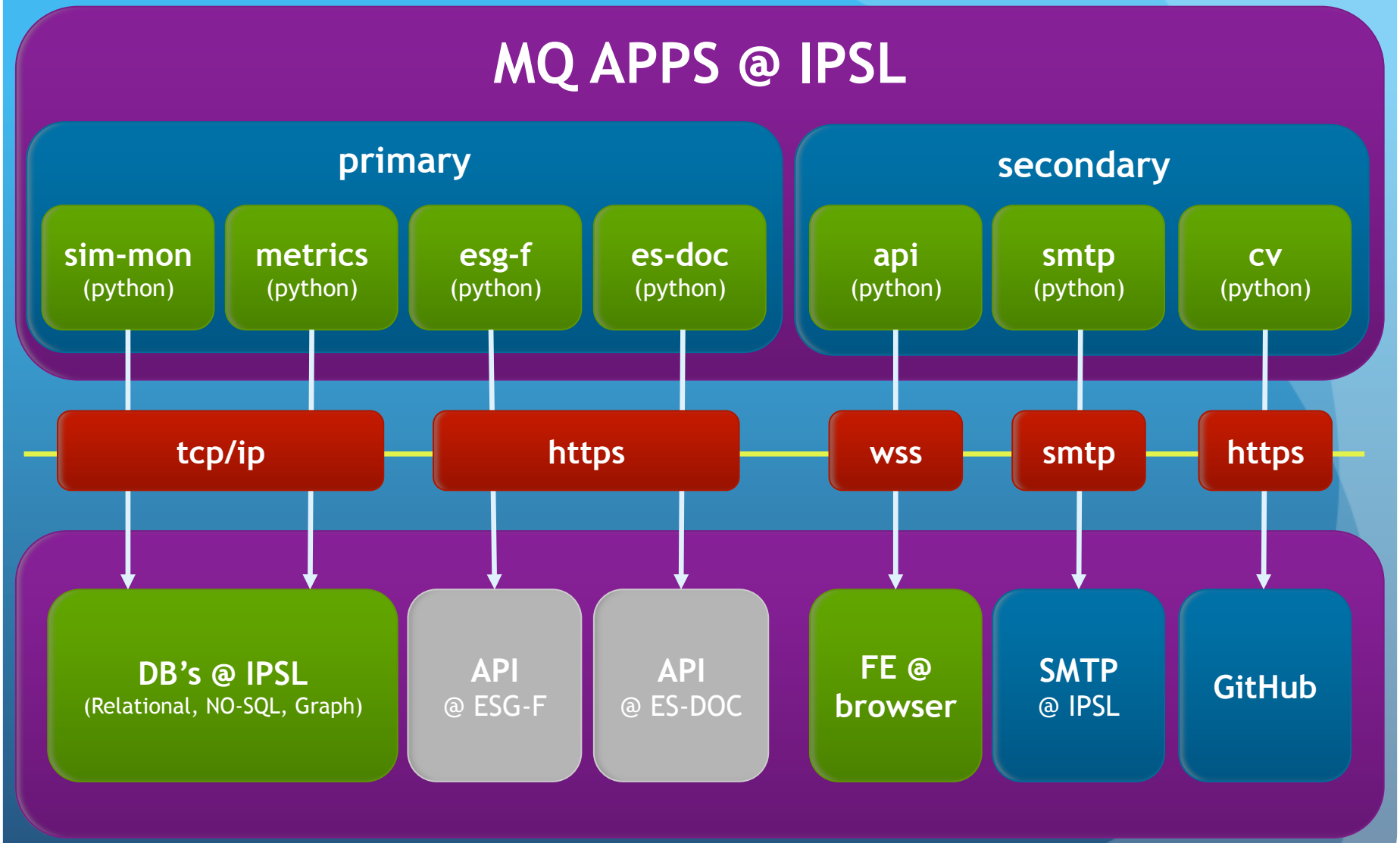
Flow 2: IPSL.SMTP ---> IPSL.MQ



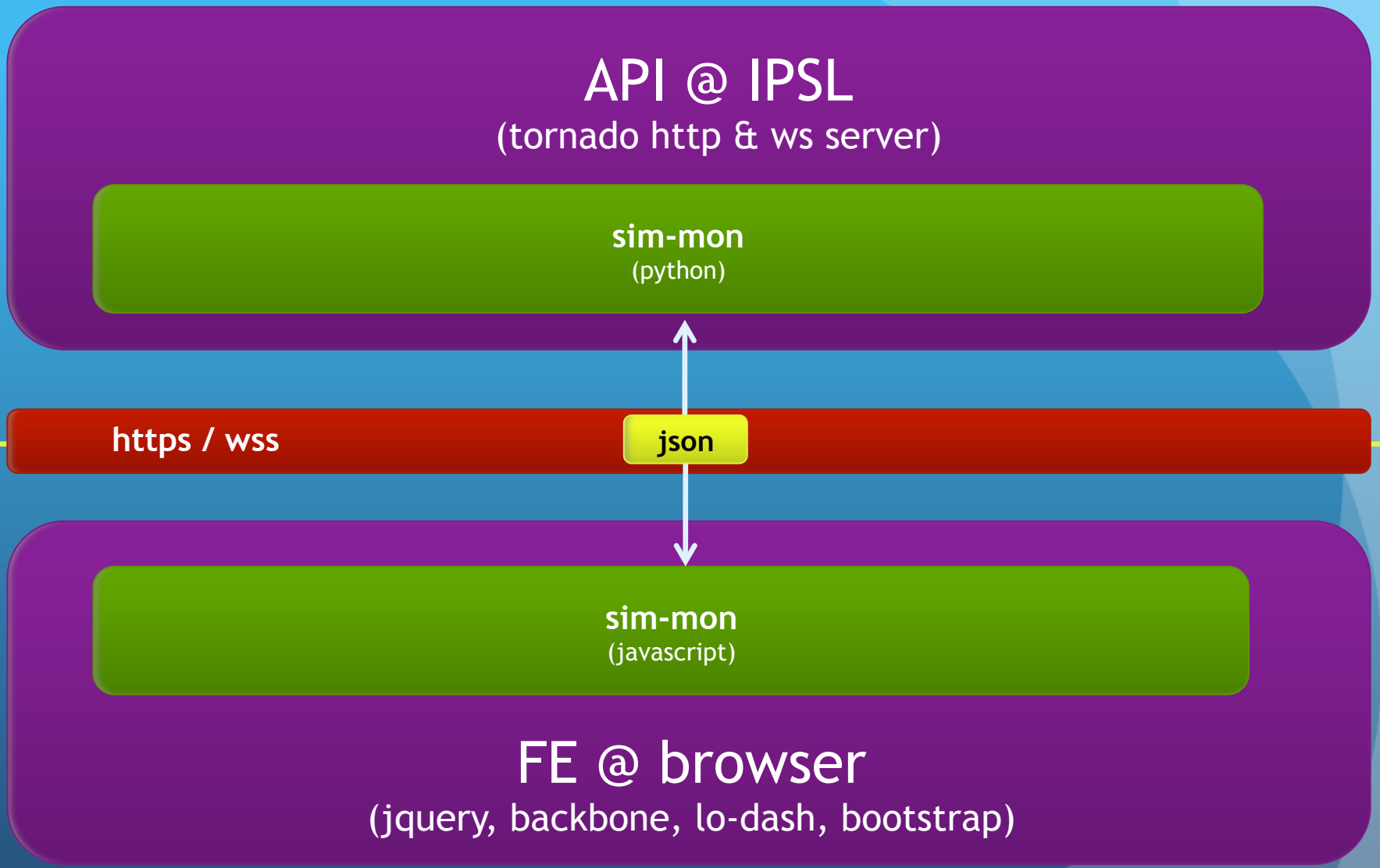
Flow 3: IPSL.MQ <---> IPSL.MQ-APP



Flow 4: IPSL.MQ-APP ---> Other



Flow 5: IPSL.API ---> IPSL.FE



Rabbit MQ

« Messaging that just works »

Rabbit MQ - Security

- AMPQS = transport level akin to HTTPS
- Authentication = SASL PLAIN (other schemas supported)
- Authorization = user accounts are allocated permissions to MQ vhost, exchange, queue with regular expressions

Rabbit MQ – Message Structure

- Header = AMPQ Basic Properties
  - Key / Value pairs
  - Common headers mandated by AMPQ spec
  - Prodiguer injects custom headers
- Body
  - Text blob
  - Content type / encoding specified in header
  - Platform passes decoded messages to consumers

Rabbit MQ - Durability

- Ensuring buffered messages aren't lost if server crashes
- RabbitMQ persists messages to disk
- Messages marked as persistent and exchanges as durable
- Incurs performance overhead

Rabbit MQ - Reliability

- Ensuring messages are reliably published / consumed
- Publishers:
  - Receive confirmation when message reaches exchange
  - If unconfirmed then need failure strategy such as “retry 3 times and then save to local file system”
- Consumers:
  - Acknowledge when unit of work succeeds
  - Acknowledged messages are removed from queue
  - Unacknowledged messages require failure strategy, e.g. retry

Rabbit MQ - Routing

- MQ producers & consumers bind to exchanges
- Producers specify a "." delimited routing key:
  - [mode].[user-id].[producer-id].[app-id].[type]
- Consumers specify a routing key filter:
  - e.g. *.*.*.*.0000 = simulation initialisation messages
- Routing objective: optimise ratio of queues to workers so that queues are as empty as possible

Summary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Summary - I

Secure

Lossless

Scalable

Extensible

Open Source

Real time

Non-intrusive

Summary - II

Simulation monitoring & control

Data publishing

Documentation publishing

Simulation metrics publishing

HPC diagnostics aggregation

Controlled vocabulary management

Web Socket / SMS / SMTP push notifications