20 años
Hechos por Colombia

Modernization of the Colombian Day Ahead Model

Simplex
Operativo

Simplex Operativo

Outline

- Colombian unit commitment
- Combined cycle formulation
- Numerical and technological challenges
- Modernization
- Simplex Operativo
- Software architecture
- Conclusions
- Future work

Colombian Unit Commitment

The model considers the following technical characteristics:

- Fixed start-up and shutdown block ramps
- Step-wise like ramps
- Tendency change ramps
- Affine ramps
- Stable load
- Forbidden generation ranges
- Areas
- Other classic constraints

1994

- Initial formulation.

2020

- Introduce generation units in the model formulation.

2022

- Change the formulation for combined cycled power plants.
- Introduce start-up cost by unit, fuel and thermal status.

Combined cycle power plants

Hybrid model

Definition

A combined cycle power plant can have many different configuration but just use one at any time.

Configuration

-Set of combustion units and steam units.

-Each has its own parameters.

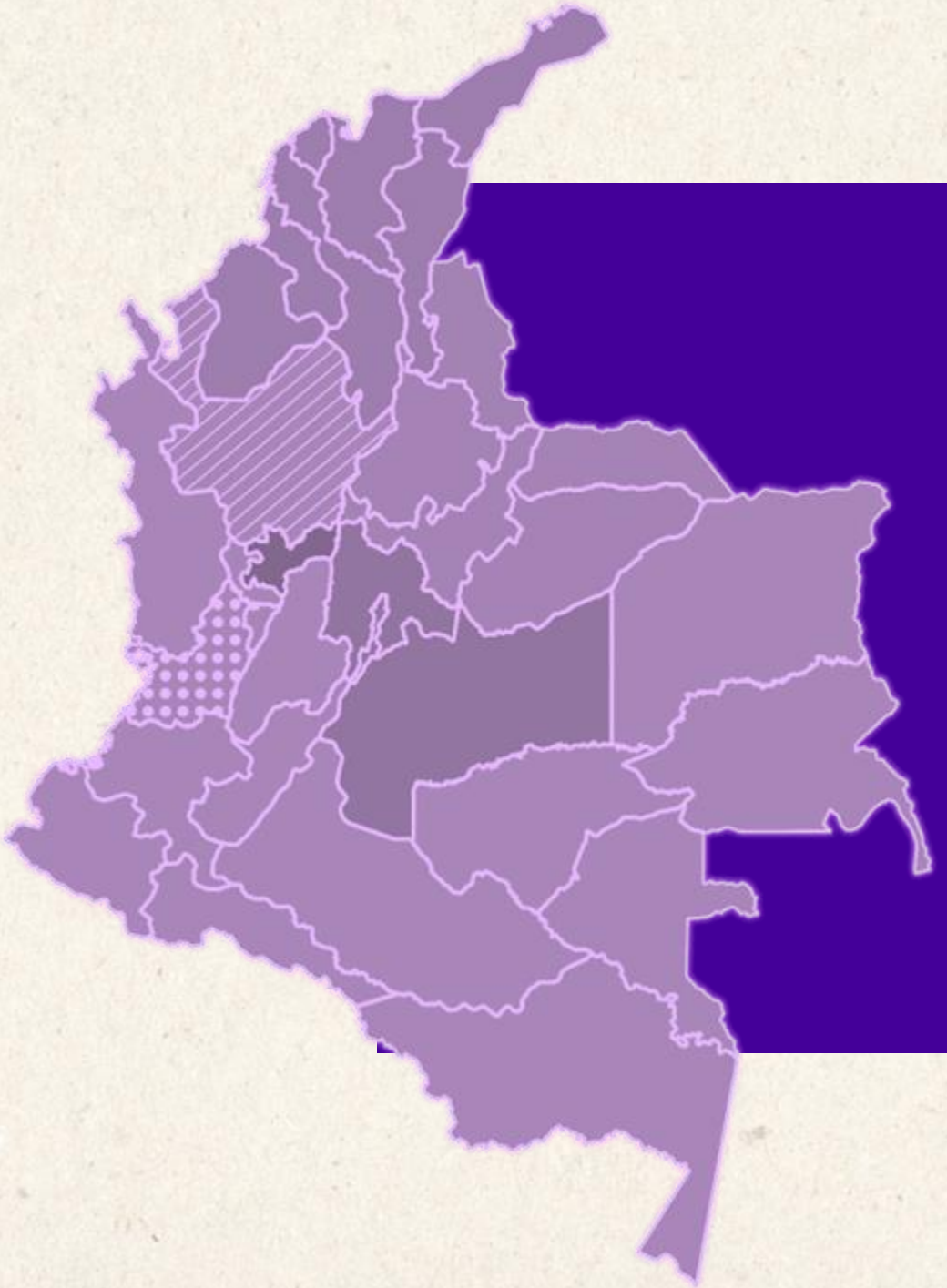
-The plant can change the configuration between periods.

Unit

Each unit has its own technical parameters and constraints.

Numerical issues

The latest model gave us a more flexible day ahead and operation also reduces operational costs, but it increased the solution time and the numerical issues.



- Solver parameters
- Reformulation
- Race against time
- Solvers

Modernization

Python interface

Simplex Operativo

Model rewrite

Architecture

Software Architecture

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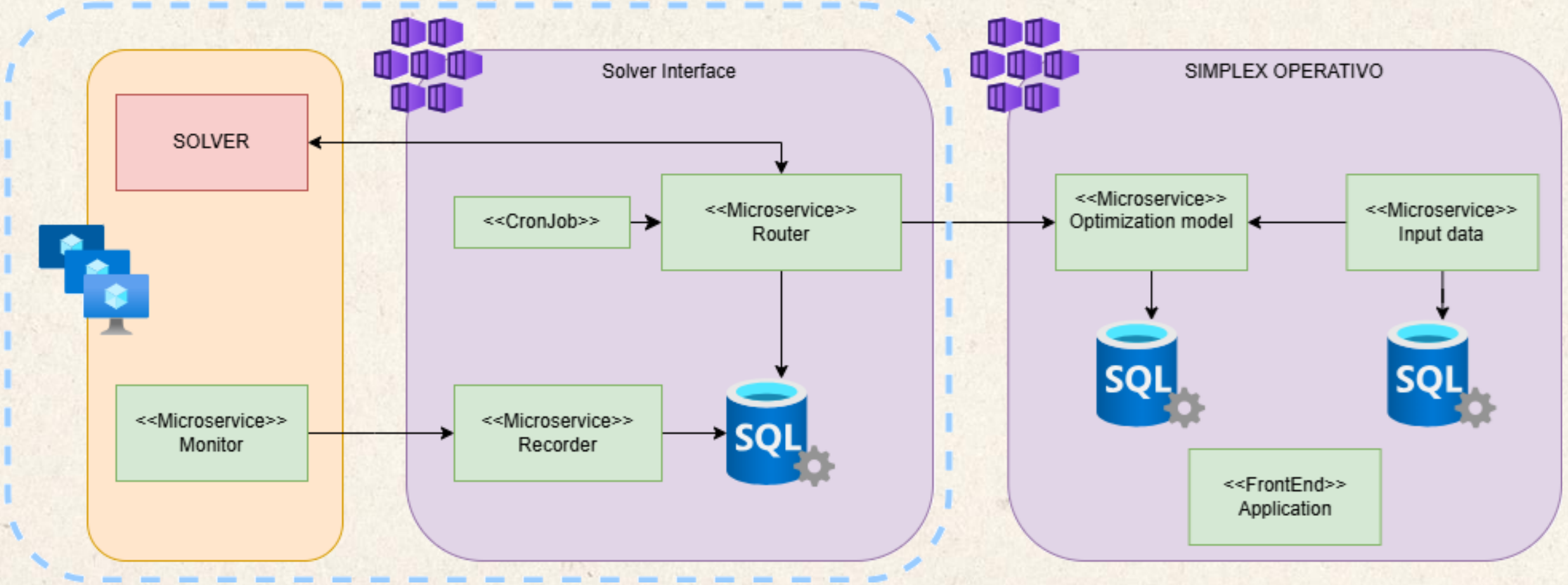


Software Architecture

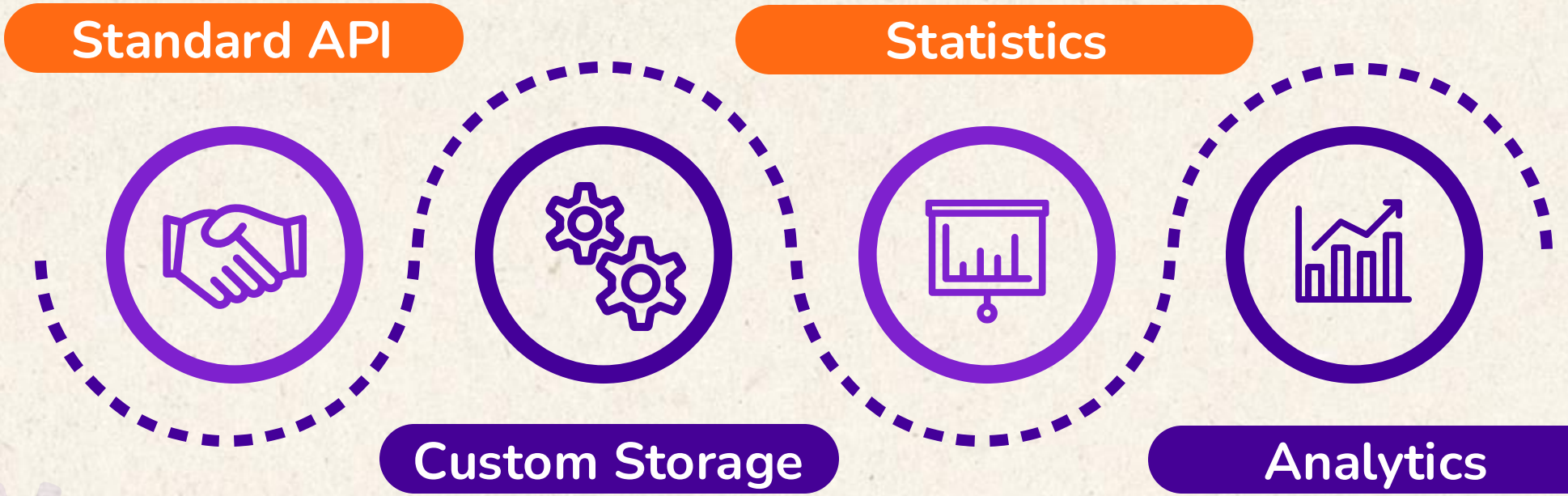
Maintainable

Reliable

Scalable

Secure

Software
Architecture



Seleccionar casos
Gestionar información
Unidades
Plantas
SAEB
Barras
Subáreas
Áreas
Condiciones iniciales
Control de restricciones
Interconexión
Parámetros
Zonas de seguridad
Administrar AGC
Procesar Redespacho
Clasificación seguridad
Reportes
Observaciones
Gestión Modelo

No existen condiciones finales SAEB para el caso de análisis de referencia RE0000006848

DE0000034159 - Despacho Real Nacional

Editar caso | Exportación de energía

Día de la semana: Jueves **Tipo de día:** Festivo **Función objetivo:** 32,558,481,279.61 **Resultado Gap Relativo:** 0.000000000000 **Fecha:** 01/05/2025

Cambiar caso

Ver solo elementos activos | Publicar legados | Generar mapeos legados | Carga de datos | Ejecutar modelo

Condiciones iniciales

Cargar todas las condiciones iniciales

Recursos | SAEB | Unidades

Modelo | Inicial

Cargar condiciones | Restablecer datos | Guardar

Elementos	GPP23	GPP24	AGC	BLOQUESPINI1	CONFENTRADA	CONFPINI1	CONFSALIDA	DISPPINI1	ESTADOPINI1	NARRANQUESPINI1	PRUEBAS	TAPUBLICAR	TCEPENDIENTE	TDISPPINI1	TFL	TL	TULT
BARRANQUILLA 3	0	0	0	0	0	1	0	4008	NA	3	0	10	0	4008	873	0	5312
BARRANQUILLA 4	0	0	0	0	0	1	0	4248	NA	11	0	10	0	4248	998	0	9012
CARTAGENA 1	0	0	0	0	0	1	0	168	NA	1	0	10	0	168	3700	0	9012
CARTAGENA 2	0	0	0	0	0	1	0	96	NA	3	0	10	0	96	193	0	168
CARTAGENA 3	0	0	0	0	0	1	0	0	NA	0	0	10	0	0	9012	0	9012
FLORES 4 CC	0	0	0	0	0	0	0	0	NA	19	0	10	0	0	105	0	120
FLORES I CC	65	65	0	0	0	1	0	1464	NA	10	0	10	0	1464	0	21	24
GECELCA 3	90	90	0	1	0	1	1	1403	DN	15	0	10	0	1403	0	0	6110
GECELCA 32	0	0	0	0	0	1	0	1511	NA	6	0	10	0	1511	45	0	4955
GUAJIRA 1	72	72	0	0	0	2	0	552	NA	0	0	10	0	552	0	543	4032
GUAJIRA 2	130	130	0	0	0	2	0	72	NA	4	0	10	0	72	0	36	440
MERILECTRICA 1	0	0	0	0	0	1	0	864	NA	36	0	10	0	864	88	0	9012
MIEL I	0	186	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PAIPA 1	0	0	0	0	0	1	0	1008	NA	21	0	10	0	1008	1727	0	7389
PAIPA 2	0	0	0	0	0	1	0	2023	NA	16	0	10	0	2023	1177	0	9012
PAIPA 3	0	0	0	0	0	1	0	161	NA	7	0	10	0	161	103	0	7389
PAIPA 4	0	0	0	0	0	1	0	2370	NA	16	0	10	0	2370	722	0	2449
PROELECTRICA 1	0	0	0	0	0	1	0	0	NA	21	0	10	0	0	152	0	9012
PROELECTRICA 2	42	42	0	0	0	1	0	53	NA	1	0	10	0	53	0	53	9012

Simplex Operativo

Conclusions

- Fast, efficient and detailed day ahead model.
- Reduction of processing times.
- Scalable and secure architecture.
- Simplex Operativo is the foundation for the Energy transition.

Future work

- Storage integration into the network.
- Integration of very short time dispatch into Simplex Operativo.
- Increase in renewable and uncertain energy.