NBD-PWG

Making Analytics as Services Use Case Template

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Case Study Title: HVAC Recommendation

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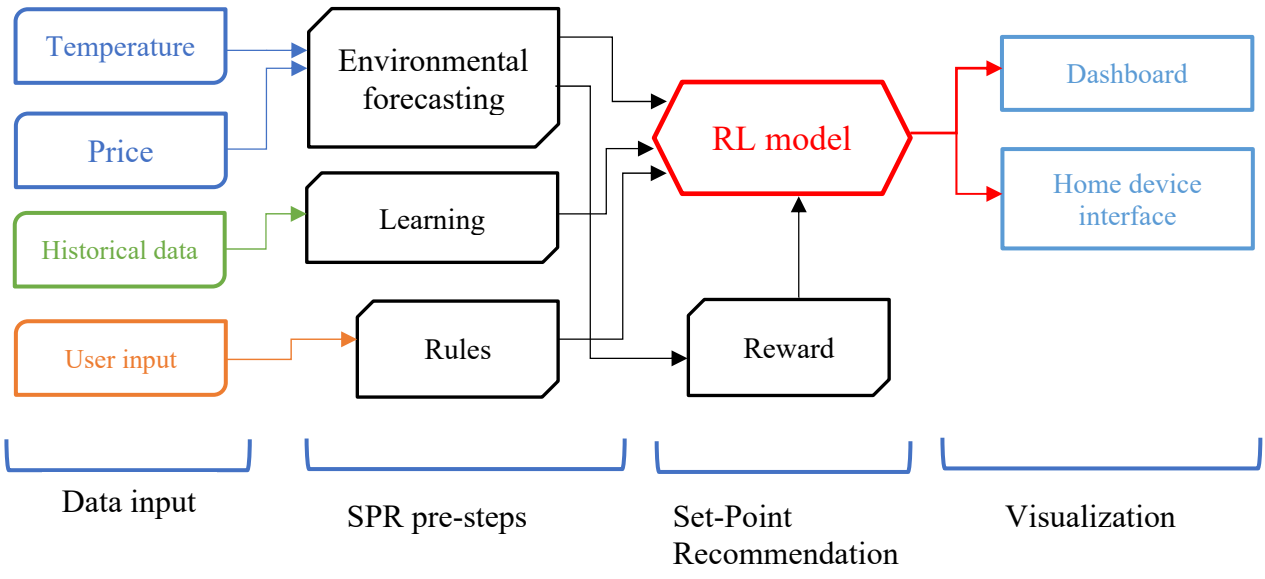
Background

Continuous streaming data is produced by heat ventilation and air conditioning (HVAC) systems every day from the residential houses. This data is stored in a databased on the cloud as it arrives. The data is used to calculate what should be the next HVAC set point in the house with respect to user preferences. Periodic recommendations considering environmental parameters, user comfort level and past user preferences require advanced machine learning algorithm called reinforcement learning. Accurate recommendations can save energy and reduce cost. This functionality has three parts Environmental Forecasting (EF), Learning from the past, (LP), and Set-Point Recommendation (SPR). EF calculates weather temperature and price predictions. LP learns from the behavior in the past. SPR model calculates next set-point based on past experience and EF predictions. Figure 1 shows the general modeling system flow chat.



Functionalities and Activities (based on Big Data Application Provider of NBDIF Ref. Architecture)

In this case study, we only focus on three main functionalities, namely EF, LP and SPR, and their activities. Figure 2 shows the cross-functional diagram for their actions.

EF Activities:

1. *weatherD* – Collects current weather temperature and predicted temperature for timestamp X.
2. *priceD* – Collects current electricity price and predicted price for timestamp X.
3. *pred* – Extract needed data fields and packs it into an intermediate file format. Input data from the output of *weatherD* and *priceD*.

LP Activities:

1. *hist* – Prepares history data points and creates initial condition weights.
2. *reward* – Generates reward based on the current weatherD and priceD.
3. *learn* – Collects data from current weatherD, priced, reward.

SPR Activities:

1. *rules* – Creates rules based on user preferences and conversion preferences.
2. *rlmodel* – Interpolates the output from learn, rules and generates set point recommendation

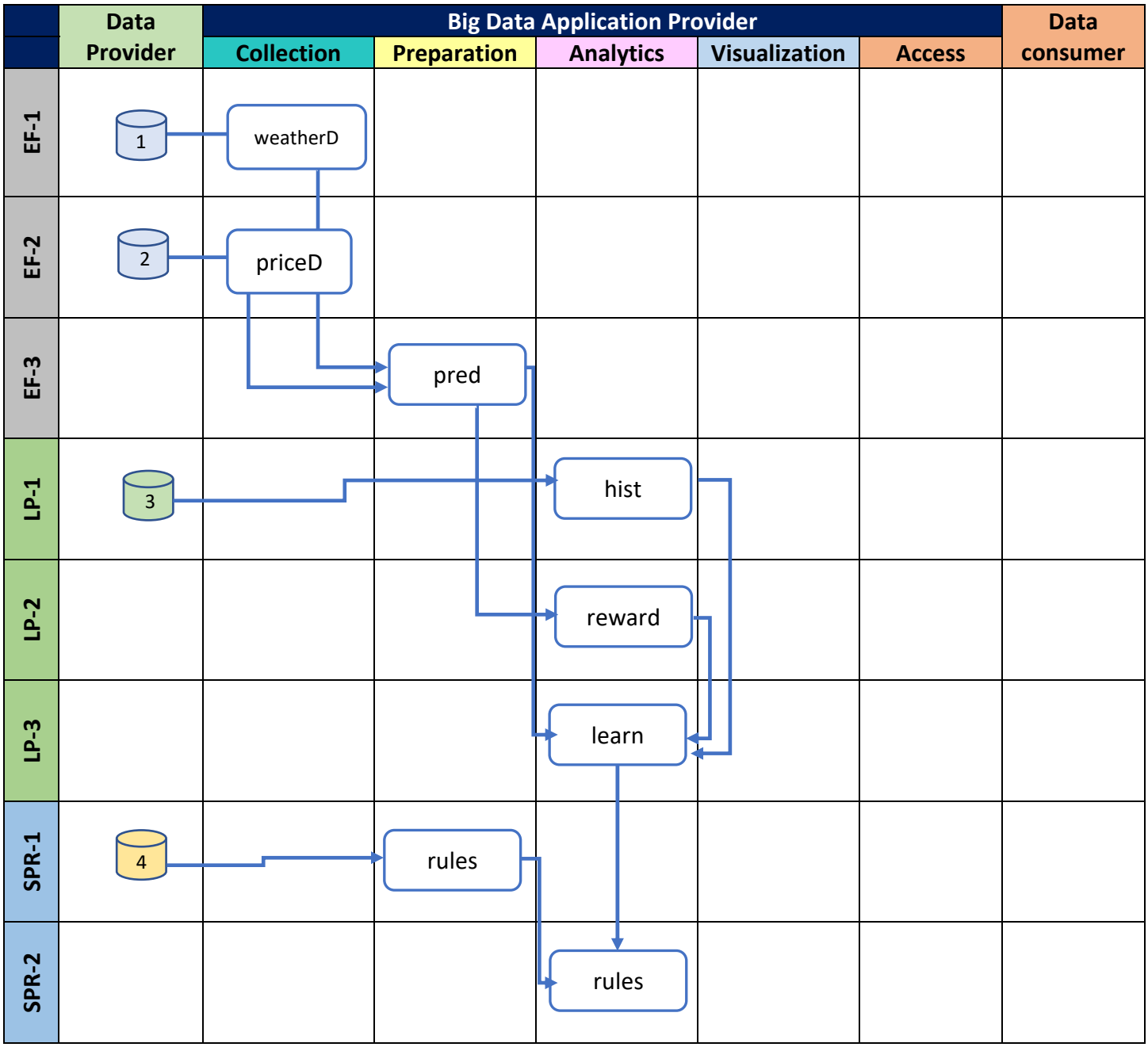


Figure 2: Cross Functional Diagram