Web Shop Scenario

July 10, 2013

1 Introduction

This report presents the scenario of a web shop that is modeled. The web shop offers to its customers different options to purchase products. Each purchase service invokes other sub-services and results in different user profiles that are kept by the involved service providers (i.e., the web shop and the postal service company). The user profiles are automatically compiled for different types of users from the input model –that represents these services– using IDP [1]. Section 2 presents the scenario. The IDP output that represents the user profiles of the service providers, is shown in Section 3.

2 Scenario

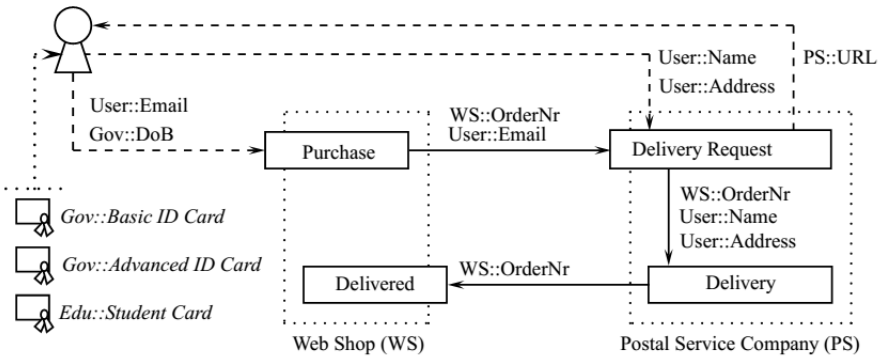

Figure 1: Scenario

The major components in the scenario are depicted in Figure 1. It consists of two service providers, namely a web shop (WS) and a postal service

company (PS). A consumer can purchase products at an online website managed by WS. As the shop wants to exclude minors, a consumer needs to prove to be older than 18. The web shop supports two credential technologies to fulfill that prerequisite. Either the consumer uses a basic electronic identity card or a more privacy-friendly one. We assume that the former consists of an X.509 certificate which embeds the customer's *name*, *address*, *date of birth* (DoB), and *social security number* (SSN), and the latter can be an anonymous credential which contains the same attributes. Anonymous credentials allow to selectively disclose attributes. More specifically, a user can prove to be older than 18 without revealing his date of birth. Students can purchase goods at a reduced prize if they show their electronic student card. It consists of an X.509 certificate with the student's *name*, *address*, and *institute* as attributes. Consumers also need to disclose their email address when they want to buy a product. When a purchase transaction is completed, WS sends transaction details together with personalized recommendations to the consumer's email address. Also, WS shares the order number (OrderNr) and email address (Email) with PS, and the user is redirected to PS. The consumer additionally needs to fill in his *name* and *address* in the registration form provided by PS. PS collects the data and sends a unique hyperlink to the user's mailbox which can be used to track the delivery status. After delivery, PS informs WS that the delivery corresponding to *OrderNr* was successful. Note that, for simplicity, we make abstraction of the data exchanged at communication level.

3 Generated User Profiles

This section presents the IDP output results for the modeled web shop. These represent the user profiles of the web shop and the postal service company in the case where the user has only storage trust in the postal service company and has distribution trust in the web shop, namely $T_S = \{PS\}$ and $T_D = \{WS\}$. The format of the output is:

$$\text{UserProfile}(\text{Organization}, \text{Identifier}, \text{Service}, \text{Attribute}, \text{Stakeholder}).$$

This predicate relates an *Attribute* with a user profile of an *Organization* that can be linked with an *Identifier* after the execution of a user invoked *Service*. Each of the attributes is certified by a *Stakeholder*. For instance, the government certifies the name of its citizens via their basic electronic identity card.

The user profiles are compiled for the following services:

- Purchase a product using the basic identity card: δ^{a*}_{WS}.

- Purchase a product using the privacy-friendly identity card: $\delta^{b*}_{\mathrm{WS}}$.
- Purchase a product with a reduction using the basic identity card: $\delta^{c*}_{\mathrm{WS}}$.
- Purchase a product with a reduction using the privacy-friendly identity card: $\delta^{d*}_{\mathrm{WS}}$.

Two groups of user profiles are distinguished, user profiles that are identifiable and user profiles that are pseudonymous.

3.1 Identifiable profiles

User profile $P^{Identity1}_{\mathrm{WS}}(G|\delta^{a*}_{\mathrm{WS}})$
$WS, Identity1, BasicPurchaseServ, Address, Government$
$WS, Identity1, BasicPurchaseServ, Address, User$
$WS, Identity1, BasicPurchaseServ, AgeLimit, Government$
$WS, Identity1, BasicPurchaseServ, DoB, Government$
$WS, Identity1, BasicPurchaseServ, EMail, User$
$WS, Identity1, BasicPurchaseServ, Name, Government$
$WS, Identity1, BasicPurchaseServ, Name, User$
$WS, Identity1, BasicPurchaseServ, OrderNr, WS$
$WS, Identity1, BasicPurchaseServ, SSN, Government$
$WS, Identity1, BasicPurchaseServ, URL, PS$

User profile $P^{Identity1}_{\mathrm{WS}}(G|\delta^{c*}_{\mathrm{WS}})$
$WS, Identity1, BasicReductionPurchaseServ, Address, Government$
$WS, Identity1, BasicReductionPurchaseServ, Address, University$
$WS, Identity1, BasicReductionPurchaseServ, Address, User$
$WS, Identity1, BasicReductionPurchaseServ, AgeLimit, Government$
$WS, Identity1, BasicReductionPurchaseServ, DoB, Government$
$WS, Identity1, BasicReductionPurchaseServ, EMail, User$
$WS, Identity1, BasicReductionPurchaseServ, Institute, University$
$WS, Identity1, BasicReductionPurchaseServ, Name, Government$
$WS, Identity1, BasicReductionPurchaseServ, Name, University$
$WS, Identity1, BasicReductionPurchaseServ, Name, User$
$WS, Identity1, BasicReductionPurchaseServ, OrderNr, WS$
$WS, Identity1, BasicReductionPurchaseServ, SSN, Government$
$WS, Identity1, BasicReductionPurchaseServ, URL, PS$

User profile $P^{Identity1}_{\mathrm{WS}}(G|\delta^{b*}_{\mathrm{WS}})$
$WS, Identity1, PrivPurchaseServ, Address, User$
$WS, Identity1, PrivPurchaseServ, AgeLimit, Government$
$WS, Identity1, PrivPurchaseServ, EMail, User$
$WS, Identity1, PrivPurchaseServ, Name, User$
$WS, Identity1, PrivPurchaseServ, OrderNr, WS$
$WS, Identity1, PrivPurchaseServ, URL, PS$

User profile $P_{\mathrm{WS}}^{Identity1}(G|\delta_{\mathrm{WS}}^{d*})$
$WS, Identity1, PrivReductionPurchaseServ, Address, University$
$WS, Identity1, PrivReductionPurchaseServ, Address, User$
$WS, Identity1, PrivReductionPurchaseServ, AgeLimit, Government$
$WS, Identity1, PrivReductionPurchaseServ, EMail, User$
$WS, Identity1, PrivReductionPurchaseServ, Institute, University$
$WS, Identity1, PrivReductionPurchaseServ, Name, University$
$WS, Identity1, PrivReductionPurchaseServ, Name, User$
$WS, Identity1, PrivReductionPurchaseServ, OrderNr, WS$
$WS, Identity1, PrivReductionPurchaseServ, URL, PS$

User profile $P_{\mathrm{PS}}^{Identity1}(G|\delta_{\mathrm{WS}}^{a*})$
$PS, Identity1, BasicPurchaseServ, EMail, User$
$PS, Identity1, BasicPurchaseServ, Name, User$
$PS, Identity1, BasicPurchaseServ, OrderNr, WS$
$PS, Identity1, BasicPurchaseServ, URL, PS$

User profile $P_{\mathrm{PS}}^{Identity1}(G|\delta_{\mathrm{WS}}^{c*})$
$PS, Identity1, BasicReductionPurchaseServ, Address, User$
$PS, Identity1, BasicReductionPurchaseServ, EMail, User$
$PS, Identity1, BasicReductionPurchaseServ, Name, User$
$PS, Identity1, BasicReductionPurchaseServ, OrderNr, WS$
$PS, Identity1, BasicReductionPurchaseServ, URL, PS$

User profile $P_{\mathrm{PS}}^{Identity1}(G|\delta_{\mathrm{WS}}^{b*})$
$PS, Identity1, PrivPurchaseServ, Address, User$
$PS, Identity1, PrivPurchaseServ, EMail, User$
$PS, Identity1, PrivPurchaseServ, Name, User$
$PS, Identity1, PrivPurchaseServ, OrderNr, WS$
$PS, Identity1, PrivPurchaseServ, URL, PS$

User profile $P_{\mathrm{PS}}^{Identity1}(G|\delta_{\mathrm{WS}}^{d*})$
$PS, Identity1, PrivReductionPurchaseServ, Address, User$
$PS, Identity1, PrivReductionPurchaseServ, EMail, User$
$PS, Identity1, PrivReductionPurchaseServ, Name, User$
$PS, Identity1, PrivReductionPurchaseServ, OrderNr, WS$
$PS, Identity1, PrivReductionPurchaseServ, URL, PS$

3.2 Pseudonymous profiles

User profile $P_{\mathrm{WS}}^{Nym1}(G|\delta_{\mathrm{WS}}^{a*})$
$WS, Nym1, BasicPurchaseServ, Address, Government$
$WS, Nym1, BasicPurchaseServ, Address, User$
$WS, Nym1, BasicPurchaseServ, AgeLimit, Government$
$WS, Nym1, BasicPurchaseServ, DoB, Government$
$WS, Nym1, BasicPurchaseServ, EMail, User$

$WS, Nym1, BasicPurchaseServ, Name, Government$
$WS, Nym1, BasicPurchaseServ, Name, User$
$WS, Nym1, BasicPurchaseServ, OrderNr, WS$
$WS, Nym1, BasicPurchaseServ, SSN, Government$
$WS, Nym1, BasicPurchaseServ, URL, PS$

User profile $P_{\mathrm{WS}}^{Nym1}(G|\delta_{\mathrm{WS}}^{c*})$
$WS, Nym1, BasicReductionPurchaseServ, Address, Government$
$WS, Nym1, BasicReductionPurchaseServ, Address, University$
$WS, Nym1, BasicReductionPurchaseServ, Address, User$
$WS, Nym1, BasicReductionPurchaseServ, AgeLimit, Government$
$WS, Nym1, BasicReductionPurchaseServ, DoB, Government$
$WS, Nym1, BasicReductionPurchaseServ, EMail, User$
$WS, Nym1, BasicReductionPurchaseServ, Institute, University$
$WS, Nym1, BasicReductionPurchaseServ, Name, Government$
$WS, Nym1, BasicReductionPurchaseServ, Name, University$
$WS, Nym1, BasicReductionPurchaseServ, Name, User$
$WS, Nym1, BasicReductionPurchaseServ, OrderNr, WS$
$WS, Nym1, BasicReductionPurchaseServ, SSN, Government$
$WS, Nym1, BasicReductionPurchaseServ, URL, PS$

User profile $P_{\mathrm{WS}}^{Nym2}(G|\delta_{\mathrm{WS}}^{a*})$
$WS, Nym2, BasicPurchaseServ, Address, Government$
$WS, Nym2, BasicPurchaseServ, Address, User$
$WS, Nym2, BasicPurchaseServ, AgeLimit, Government$
$WS, Nym2, BasicPurchaseServ, DoB, Government$
$WS, Nym2, BasicPurchaseServ, EMail, User$
$WS, Nym2, BasicPurchaseServ, Name, Government$
$WS, Nym2, BasicPurchaseServ, Name, User$
$WS, Nym2, BasicPurchaseServ, OrderNr, WS$
$WS, Nym2, BasicPurchaseServ, SSN, Government$
$WS, Nym2, BasicPurchaseServ, URL, PS$

User profile $P_{\mathrm{WS}}^{Nym2}(G|\delta_{\mathrm{WS}}^{c*})$
$WS, Nym2, BasicReductionPurchaseServ, Address, Government$
$WS, Nym2, BasicReductionPurchaseServ, Address, University$
$WS, Nym2, BasicReductionPurchaseServ, Address, User$
$WS, Nym2, BasicReductionPurchaseServ, AgeLimit, Government$
$WS, Nym2, BasicReductionPurchaseServ, DoB, Government$
$WS, Nym2, BasicReductionPurchaseServ, EMail, User$
$WS, Nym2, BasicReductionPurchaseServ, Institute, University$
$WS, Nym2, BasicReductionPurchaseServ, Name, Government$
$WS, Nym2, BasicReductionPurchaseServ, Name, University$
$WS, Nym2, BasicReductionPurchaseServ, Name, User$
$WS, Nym2, BasicReductionPurchaseServ, OrderNr, WS$
$WS, Nym2, BasicReductionPurchaseServ, SSN, Government$
$WS, Nym2, BasicReductionPurchaseServ, URL, PS$

User profile $P_{\mathrm{WS}}^{Nym2}(G|\delta_{\mathrm{WS}}^{b*})$

$WS, Nym2, PrivPurchaseServ, Address, User$
$WS, Nym2, PrivPurchaseServ, AgeLimit, Government$
$WS, Nym2, PrivPurchaseServ, EMail, User$
$WS, Nym2, PrivPurchaseServ, Name, User$
$WS, Nym2, PrivPurchaseServ, OrderNr, WS$
$WS, Nym2, PrivPurchaseServ, URL, PS$

User profile $P_{\mathrm{WS}}^{Nym2}(G|\delta_{\mathrm{WS}}^{d*})$

$WS, Nym2, PrivReductionPurchaseServ, Address, University$
$WS, Nym2, PrivReductionPurchaseServ, Address, User$
$WS, Nym2, PrivReductionPurchaseServ, AgeLimit, Government$
$WS, Nym2, PrivReductionPurchaseServ, EMail, User$
$WS, Nym2, PrivReductionPurchaseServ, Institute, University$
$WS, Nym2, PrivReductionPurchaseServ, Name, University$
$WS, Nym2, PrivReductionPurchaseServ, Name, User$
$WS, Nym2, PrivReductionPurchaseServ, OrderNr, WS$
$WS, Nym2, PrivReductionPurchaseServ, URL, PS$

User profile $P_{\mathrm{WS}}^{Nym3}(G|\delta_{\mathrm{WS}}^{a*})$

$WS, Nym3, BasicPurchaseServ, Address, Government$
$WS, Nym3, BasicPurchaseServ, Address, User$
$WS, Nym3, BasicPurchaseServ, AgeLimit, Government$
$WS, Nym3, BasicPurchaseServ, DoB, Government$
$WS, Nym3, BasicPurchaseServ, EMail, User$
$WS, Nym3, BasicPurchaseServ, Name, Government$
$WS, Nym3, BasicPurchaseServ, Name, User$
$WS, Nym3, BasicPurchaseServ, OrderNr, WS$
$WS, Nym3, BasicPurchaseServ, SSN, Government$
$WS, Nym3, BasicPurchaseServ, URL, PS$

User profile $P_{\mathrm{WS}}^{Nym3}(G|\delta_{\mathrm{WS}}^{c*})$

$WS, Nym3, BasicReductionPurchaseServ, Address, Government$
$WS, Nym3, BasicReductionPurchaseServ, Address, University$
$WS, Nym3, BasicReductionPurchaseServ, Address, User$
$WS, Nym3, BasicReductionPurchaseServ, AgeLimit, Government$
$WS, Nym3, BasicReductionPurchaseServ, DoB, Government$
$WS, Nym3, BasicReductionPurchaseServ, EMail, User$
$WS, Nym3, BasicReductionPurchaseServ, Institute, University$
$WS, Nym3, BasicReductionPurchaseServ, Name, Government$
$WS, Nym3, BasicReductionPurchaseServ, Name, University$
$WS, Nym3, BasicReductionPurchaseServ, Name, User$
$WS, Nym3, BasicReductionPurchaseServ, OrderNr, WS$
$WS, Nym3, BasicReductionPurchaseServ, SSN, Government$
$WS, Nym3, BasicReductionPurchaseServ, URL, PS$

User profile $P_{\mathrm{WS}}^{Nym3}(G|\delta_{\mathrm{WS}}^{b*})$

$WS, Nym3, PrivPurchaseServ, Address, User$

$WS, Nym3, PrivPurchaseServ, AgeLimit, Government$
$WS, Nym3, PrivPurchaseServ, EMail, User$
$WS, Nym3, PrivPurchaseServ, Name, User$
$WS, Nym3, PrivPurchaseServ, OrderNr, WS$
$WS, Nym3, PrivPurchaseServ, URL, PS$

User profile $P_{\mathrm{WS}}^{Nym3}(G|\delta_{\mathrm{WS}}^{d*})$
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$WS, Nym3, PrivReductionPurchaseServ, AgeLimit, Government$
$WS, Nym3, PrivReductionPurchaseServ, EMail, User$
$WS, Nym3, PrivReductionPurchaseServ, Institute, University$
$WS, Nym3, PrivReductionPurchaseServ, Name, University$
$WS, Nym3, PrivReductionPurchaseServ, Name, User$
$WS, Nym3, PrivReductionPurchaseServ, OrderNr, WS$
$WS, Nym3, PrivReductionPurchaseServ, URL, PS$

User profile $P_{\mathrm{WS}}^{Nym4}(G|\delta_{\mathrm{WS}}^{a*})$
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$WS, Nym4, BasicPurchaseServ, Address, User$
$WS, Nym4, BasicPurchaseServ, AgeLimit, Government$
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$WS, Nym4, BasicPurchaseServ, OrderNr, WS$
$WS, Nym4, BasicPurchaseServ, SSN, Government$
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User profile $P_{\mathrm{WS}}^{Nym4}(G|\delta_{\mathrm{WS}}^{c*})$
$WS, Nym4, BasicReductionPurchaseServ, Address, Government$
$WS, Nym4, BasicReductionPurchaseServ, Address, University$
$WS, Nym4, BasicReductionPurchaseServ, Address, User$
$WS, Nym4, BasicReductionPurchaseServ, AgeLimit, Government$
$WS, Nym4, BasicReductionPurchaseServ, DoB, Government$
$WS, Nym4, BasicReductionPurchaseServ, EMail, User$
$WS, Nym4, BasicReductionPurchaseServ, Institute, University$
$WS, Nym4, BasicReductionPurchaseServ, Name, Government$
$WS, Nym4, BasicReductionPurchaseServ, Name, University$
$WS, Nym4, BasicReductionPurchaseServ, Name, User$
$WS, Nym4, BasicReductionPurchaseServ, OrderNr, WS$
$WS, Nym4, BasicReductionPurchaseServ, SSN, Government$
$WS, Nym4, BasicReductionPurchaseServ, URL, PS$

User profile $P_{\mathrm{WS}}^{Nym4}(G|\delta_{\mathrm{WS}}^{b*})$
$WS, Nym4, PrivPurchaseServ, Address, User$
$WS, Nym4, PrivPurchaseServ, AgeLimit, Government$
$WS, Nym4, PrivPurchaseServ, EMail, User$

$WS, Nym4, PrivPurchaseServ, Name, User$
$WS, Nym4, PrivPurchaseServ, OrderNr, WS$
$WS, Nym4, PrivPurchaseServ, URL, PS$

User profile $P_{\mathrm{WS}}^{Nym4}(G|\delta_{\mathrm{WS}}^{d*})$
$WS, Nym4, PrivReductionPurchaseServ, Address, University$
$WS, Nym4, PrivReductionPurchaseServ, Address, User$
$WS, Nym4, PrivReductionPurchaseServ, AgeLimit, Government$
$WS, Nym4, PrivReductionPurchaseServ, EMail, User$
$WS, Nym4, PrivReductionPurchaseServ, Institute, University$
$WS, Nym4, PrivReductionPurchaseServ, Name, University$
$WS, Nym4, PrivReductionPurchaseServ, Name, User$
$WS, Nym4, PrivReductionPurchaseServ, OrderNr, WS$
$WS, Nym4, PrivReductionPurchaseServ, URL, PS$

User profile $P_{\mathrm{PS}}^{Nym2}(G|\delta_{\mathrm{PS}}^{a*})$
$PS, Nym2, BasicPurchaseServ, Address, User$
$PS, Nym2, BasicPurchaseServ, EMail, User$
$PS, Nym2, BasicPurchaseServ, Name, User$
$PS, Nym2, BasicPurchaseServ, OrderNr, WS$
$PS, Nym2, BasicPurchaseServ, URL, PS$

User profile $P_{\mathrm{PS}}^{Nym2}(G|\delta_{\mathrm{PS}}^{c*})$
$PS, Nym2, BasicReductionPurchaseServ, Address, User$
$PS, Nym2, BasicReductionPurchaseServ, EMail, User$
$PS, Nym2, BasicReductionPurchaseServ, Name, User$
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User profile $P_{\mathrm{PS}}^{Nym2}(G|\delta_{\mathrm{PS}}^{b*})$
$PS, Nym2, PrivPurchaseServ, Address, User$
$PS, Nym2, PrivPurchaseServ, EMail, User$
$PS, Nym2, PrivPurchaseServ, Name, User$
$PS, Nym2, PrivPurchaseServ, OrderNr, WS$
$PS, Nym2, PrivPurchaseServ, URL, PS$

User profile $P_{\mathrm{PS}}^{Nym2}(G|\delta_{\mathrm{PS}}^{d*})$
$PS, Nym2, PrivReductionPurchaseServ, Address, User$
$PS, Nym2, PrivReductionPurchaseServ, EMail, User$
$PS, Nym2, PrivReductionPurchaseServ, Name, User$
$PS, Nym2, PrivReductionPurchaseServ, OrderNr, WS$
$PS, Nym2, PrivReductionPurchaseServ, URL, PS$

User profile $P_{\mathrm{PS}}^{Nym3}(G|\delta_{\mathrm{PS}}^{a*})$
$PS, Nym3, BasicPurchaseServ, Address, User$
$PS, Nym3, BasicPurchaseServ, EMail, User$
$PS, Nym3, BasicPurchaseServ, Name, User$
$PS, Nym3, BasicPurchaseServ, OrderNr, WS$

$PS, Nym3, BasicPurchaseServ, URL, PS$

User profile $P_{\mathrm{PS}}^{Nym3}(G|\delta_{\mathrm{PS}}^{c*})$
$PS, Nym3, BasicReductionPurchaseServ, Address, User$
$PS, Nym3, BasicReductionPurchaseServ, EMail, User$
$PS, Nym3, BasicReductionPurchaseServ, Name, User$
$PS, Nym3, BasicReductionPurchaseServ, OrderNr, WS$
$PS, Nym3, BasicReductionPurchaseServ, URL, PS$

User profile $P_{\mathrm{PS}}^{Nym3}(G|\delta_{\mathrm{PS}}^{b*})$
$PS, Nym3, PrivPurchaseServ, Address, User$
$PS, Nym3, PrivPurchaseServ, EMail, User$
$PS, Nym3, PrivPurchaseServ, Name, User$
$PS, Nym3, PrivPurchaseServ, OrderNr, WS$
$PS, Nym3, PrivPurchaseServ, URL, PS$

User profile $P_{\mathrm{PS}}^{Nym3}(G|\delta_{\mathrm{PS}}^{d*})$
$PS, Nym3, PrivReductionPurchaseServ, Address, User$
$PS, Nym3, PrivReductionPurchaseServ, EMail, User$
$PS, Nym3, PrivReductionPurchaseServ, Name, User$
$PS, Nym3, PrivReductionPurchaseServ, OrderNr, WS$
$PS, Nym3, PrivReductionPurchaseServ, URL, PS$

User profile $P_{\mathrm{PS}}^{Nym4}(G|\delta_{\mathrm{PS}}^{a*})$
$PS, Nym4, BasicPurchaseServ, Address, User$
$PS, Nym4, BasicPurchaseServ, EMail, User$
$PS, Nym4, BasicPurchaseServ, Name, User$
$PS, Nym4, BasicPurchaseServ, OrderNr, WS$
$PS, Nym4, BasicPurchaseServ, URL, PS$

User profile $P_{\mathrm{PS}}^{Nym4}(G|\delta_{\mathrm{PS}}^{c*})$
$PS, Nym4, BasicReductionPurchaseServ, Address, User$
$PS, Nym4, BasicReductionPurchaseServ, EMail, User$
$PS, Nym4, BasicReductionPurchaseServ, Name, User$
$PS, Nym4, BasicReductionPurchaseServ, OrderNr, WS$
$PS, Nym4, BasicReductionPurchaseServ, URL, PS$

User profile $P_{\mathrm{PS}}^{Nym4}(G|\delta_{\mathrm{PS}}^{b*})$
$PS, Nym4, PrivPurchaseServ, Address, User$
$PS, Nym4, PrivPurchaseServ, EMail, User$
$PS, Nym4, PrivPurchaseServ, Name, User$
$PS, Nym4, PrivPurchaseServ, OrderNr, WS$
$PS, Nym4, PrivPurchaseServ, URL, PS$

User profile $P_{\mathrm{PS}}^{Nym4}(G|\delta_{\mathrm{PS}}^{d*})$
$PS, Nym4, PrivReductionPurchaseServ, Address, User$
$PS, Nym4, PrivReductionPurchaseServ, EMail, User$
$PS, Nym4, PrivReductionPurchaseServ, Name, User$

$PS, Nym4, PrivReductionPurchaseServ, OrderNr, WS$
$PS, Nym4, PrivReductionPurchaseServ, URL, PS$

References

[1] Johan Wittocx, Maarten Mariën, and Marc Denecker. The IDP system: a model expansion system for an extension of classical logic. In *LaSh*, pages 153–165, 2008.