a)

**Input Log:** Figure 1

**Regular** Line parsing: (?<ip>) .+ /(?<TYPE>.+).php"

**Expressions:** Execution mapping: \k<ip>



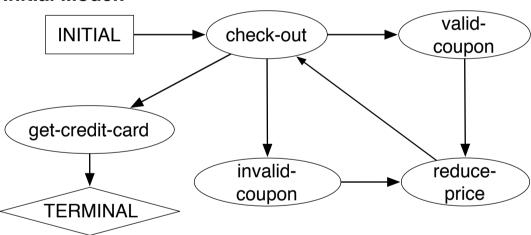
b)

## **Mined Invariants:**

check-out AP get-credit-card check-out AP invalid-coupon check-out AP reduce-price check-out AP valid-coupon check-out AFby get-credit-card invalid-coupon AFby check-out invalid-coupon AFby get-credit-card invalid-coupon AFby reduce-price reduce-price AFby check-out reduce-price AFby get-credit-card valid-coupon AFby get-credit-card valid-coupon AFby get-credit-card

valid-coupon AFby reduce-price get-credit-card NFby check-out get-credit-card NFby get-credit-card get-credit-card NFby invalid-coupon get-credit-card NFby reduce-price get-credit-card NFby valid-coupon invalid-coupon NFby invalid-coupon invalid-coupon NFby valid-coupon reduce-price NFby invalid-coupon reduce-price NFby reduce-price reduce-price NFby valid-coupon valid-coupon NFby invalid-coupon valid-coupon NFby valid-coupon

## **Initial Model:**





## / Final Model:

