***Z formal specification***

*USER* ::= *ADMIN* | *BUYER* | *ANALYST* | *DESIGNER* | *TESTER*

*CREATORS* = { *x*1: *ADMIN*, *x*2: *ANALYST* ,*x*3: *DESIGNER*, *x*4:*TESTER* | *true* ⦁(*x*1,*x*2,*x*3,*x*4) }

∅*T* ={*x*:*T*/*false*}

*PROGRAM* ={ *x*1:*PNAME*, *x*2:*BUYER*, *x*3:*CREATORS*, *x*4:*SPEC*, *x*5:*PTYPE*, *x*6:*LICENCE*, *x*7:*PRICE*,

*x*8:*SOFT* |  *x*1≠∅*PNAME* ⦁{*x*1,*x*2,*x*3,*x*4,*x*5,*x*6,*x*7,*x*8}}

*CRIT* ::= *PNAME* | *SPEC* | *PRICE* | *PTYPE*

*INFO* ={*x*1:*UNAME*, *x*2:*PASSWARD*, *x*3:*RNAME*, *x*4:*UTYPE*, *x*5:*ADDRESS*, *x*6:*EMAIL*, *x*7: *WEBPAGE*,

*x*9:*RATING*, *x*10:*programs*, *x*11:*bids* | *x*1≠∅*UNAME* ∧ *x*2≠∅*PASSWARD* ⦁(*x*1,*x*2,*x*3,*x*4,*x*5,*x*6,*x*7,*x*8,*x*9)}

*PINFO* = {*x*1: *UNAME* , *x*2: *WEBPAGE*, *x*3: *PROGRAMS*, *x*4: *BIDS* | *true* ⦁(*x*1,*x*2,*x*3,*x*4)} }

*PROGINFO* = {*x*1: *PNAME* , *x*2: *PTYPE*, *x*3: *PRICE*, *x*4: *SPEC* | *true* ⦁(*x*1,*x*2,*x*3,*x*4)} }

*The state space of the system*:

*WebSite*

*users*: ℙ*USER*

*programs* : ℙ*PROGRAM*

*bids* : ℙ*BID*

*entry* :*USER*↠*PASSWARD*

*userInfo*:*USER*⤀*INFO*

*publicInfo* :  *USER*⤀*PINFO*

*progInfo* : *PROGRAM* ⤖ *PROGINFO*

*users* = *dom userInfo* = *dom userInfo*

*Operations*:

*AddUser*

Δ*WebSite*

*user*? : *USER*

*passward* ?:*PASSWARD*

*user*? ∉ *users*

*entry* ′=*entry*∪ {*user*?↦ *passward*?}

*users ' = users ∪{ user? }*

*users' =* dom *entry'* = dom*(entry*∪ {*user*?↦ *passward*?}) = dom *entry* ∪dom {*user*?↦ *passward*?} = dom *entry* ∪{*user*? } = users ∪{*user*? }

*DeleteUser*

*user*? : *USER*

*passward* ?:*PASSWARD*

*user*? ∈ *users*

*entry* ′=*entry*∖ {*user*?↦ *passward*?}

*users*′ = *users* ∖{*user*? }

*users' =* dom *entry'* = dom*(entry*∩ C{*user*?↦ *passward*?}) =

= dom *entry*∩ *dom*C{*user*?↦ *passward*?})=*users*∩*(dom entry*∖ *dom*{*user*?↦ *passward*?})=

=*users*∩*(users*∖{*user*? }) = *users* ∖{*user*? }

*SearchUser*

Ξ*WebSite*

*uname*? : *UNAME*

*userdisp*! :*PINFO*

*userdisp*! = {*n*:*PINFO* | *pname*? ∈ *users* ∧ *publicInfo* (*uname*?) = *n*}

*SearchProgram*

Ξ*WebSite*

*pname*?: *PNAME*

*progdisp*! :*PROGINFO*

*progdisp*! = {*n*:*PROGINFO* | *pname*∈ *programs* ∧ *progInfo* (*pname*?) = *n*}

*Success*

*result*! : *RESPONSE*

*result*! = *ok*

*NotKnown*

Ξ*WebSite*

*name*? : *UNAME*

*result*! : *RESPONSE*

*name*? ∈ *users*

*RSearchUser* ≙( *SearchUser*∧ *Success* ) ∨ *NotKnown*

*SearchProgram* ≙( *SearchProgram*∧ *Success* ) ∨ *NotKnown*