Client-side and Server-side validations in a generic way

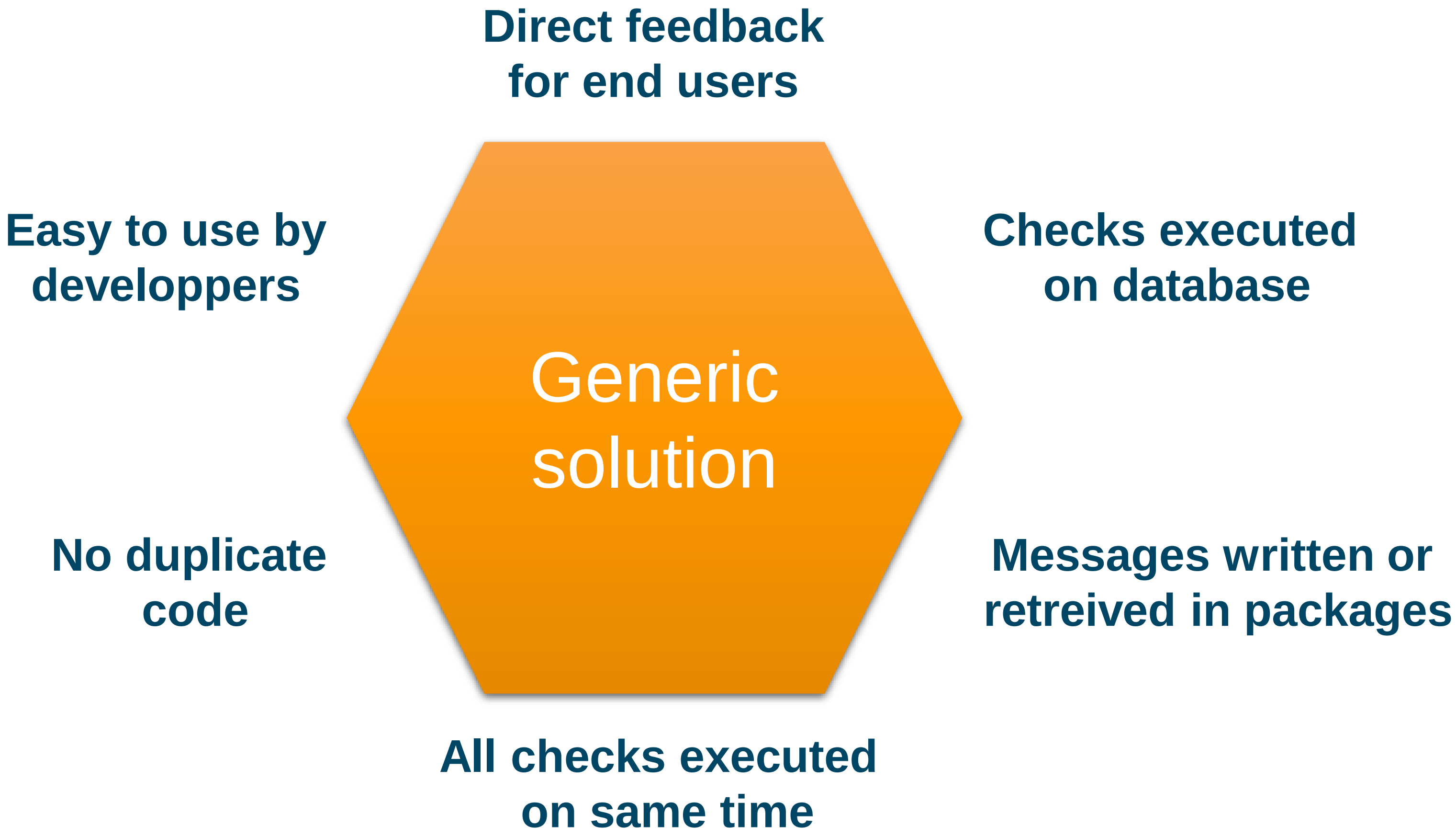
Bart Limbeek

TRANSFER SOLUTIONS

Limitations

- Only feedback at page submit
- Message are written in the APEX builder
- Client-side messages show up before custom validations
- Custom client-side checks leads often to duplicate code

Goal and requirements



Generic solution

Direct feedback for end users

Checks executed on database

Messages written or retreived in packages

All checks executed on same time

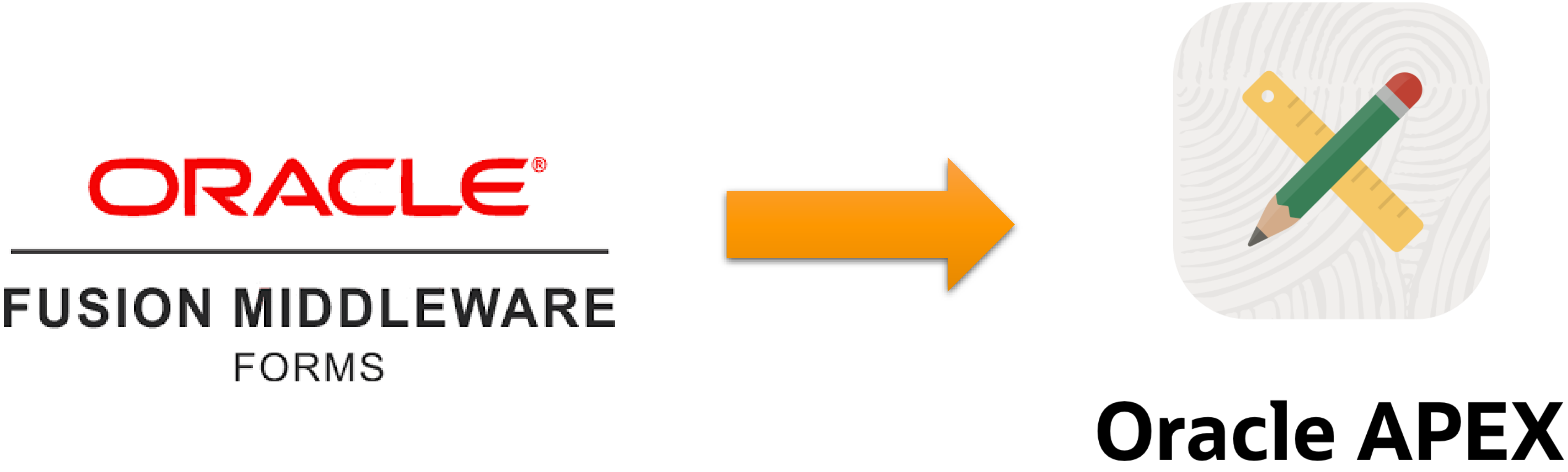
No duplicate code

Easy to use by developpers

Who am I?

- Bart Limbeek
- Oracle APEX developer
- Transfer Solutions
- Playing clarinet in a concert band
- Playing theatre

Origin of the case



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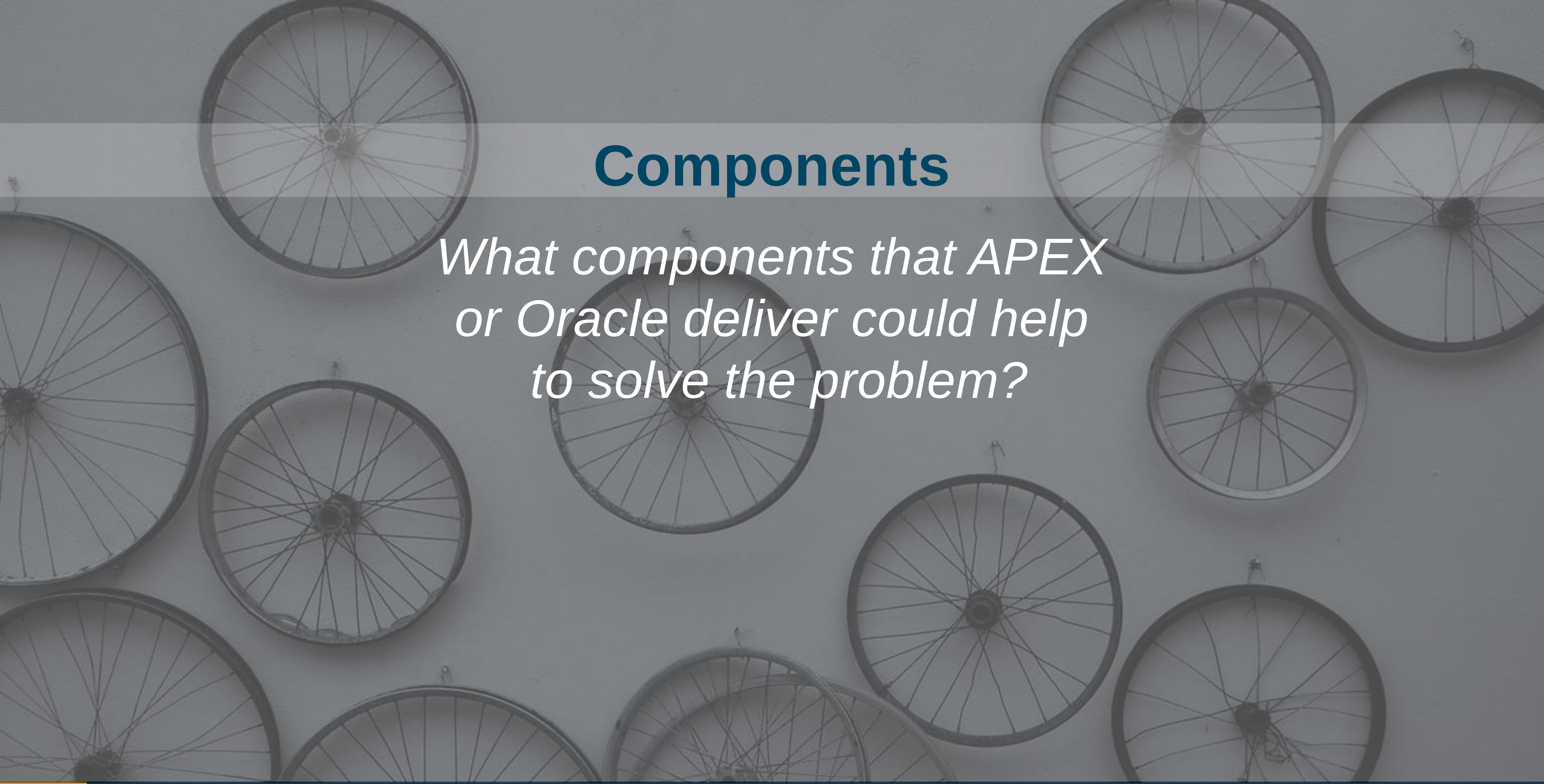
FORMS

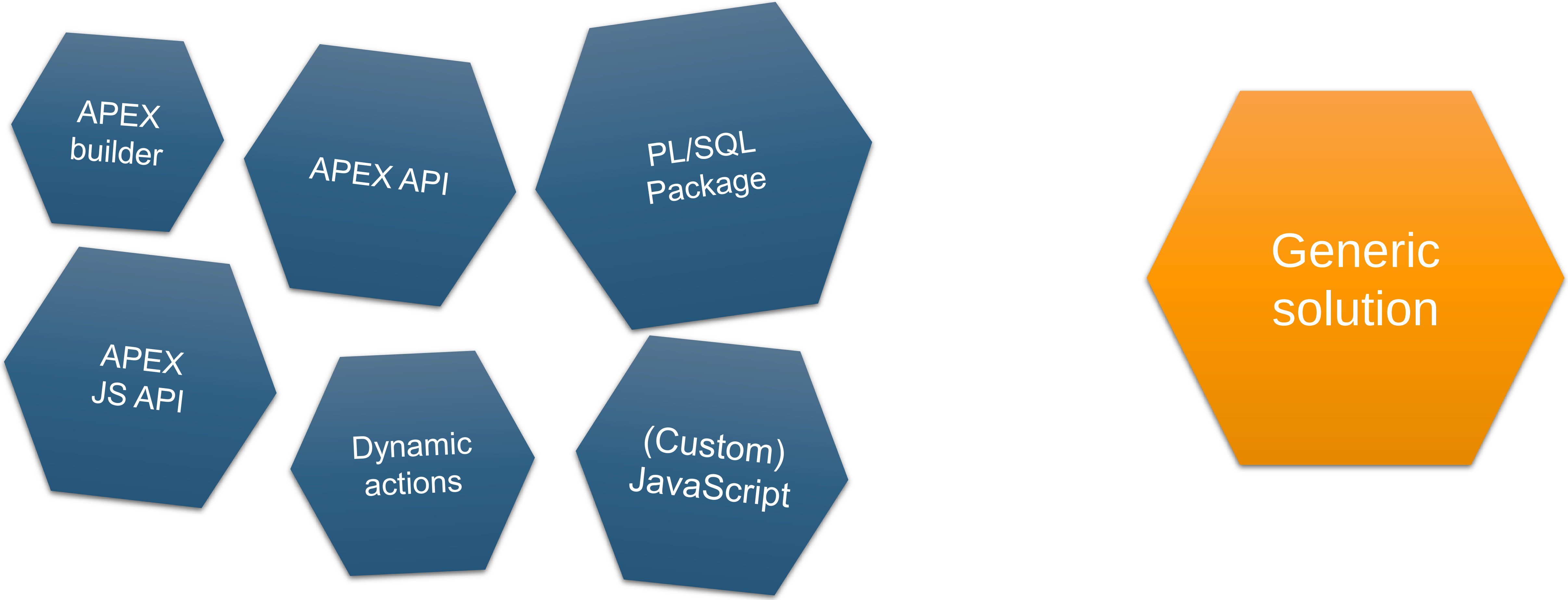
Oracle APEX



Components

What components that APEX or Oracle deliver could help to solve the problem?

Building blocks



APEX builder

APEX API

PL/SQL Package

APEX JS API

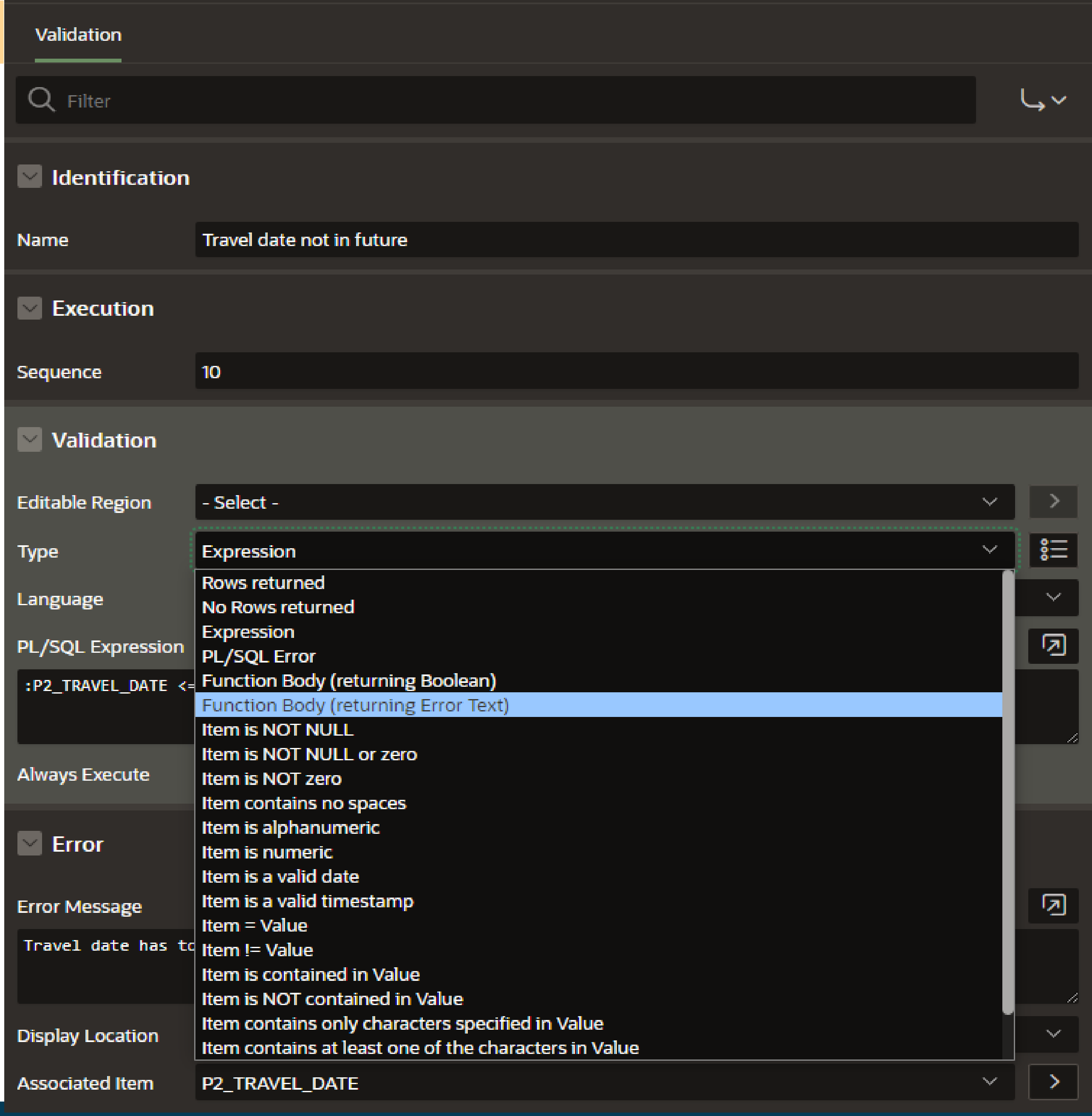
Dynamic actions

(Custom) JavaScript

Generic solution

APEX Validations

- Expression
  Not possible to validate in package
- PL/SQL Error
  Error message is written within application
- Function body (returning boolean)
  Error message is written within application
- Function body (returning error text) ✓



Validation

Filter

Identification

Name	Travel date not in future

Execution

Sequence	10

Validation

Editable Region	- Select -
Type	Expression
Language	
PL/SQL Expression	:P2_TRAVEL_DATE <=
Always Execute	

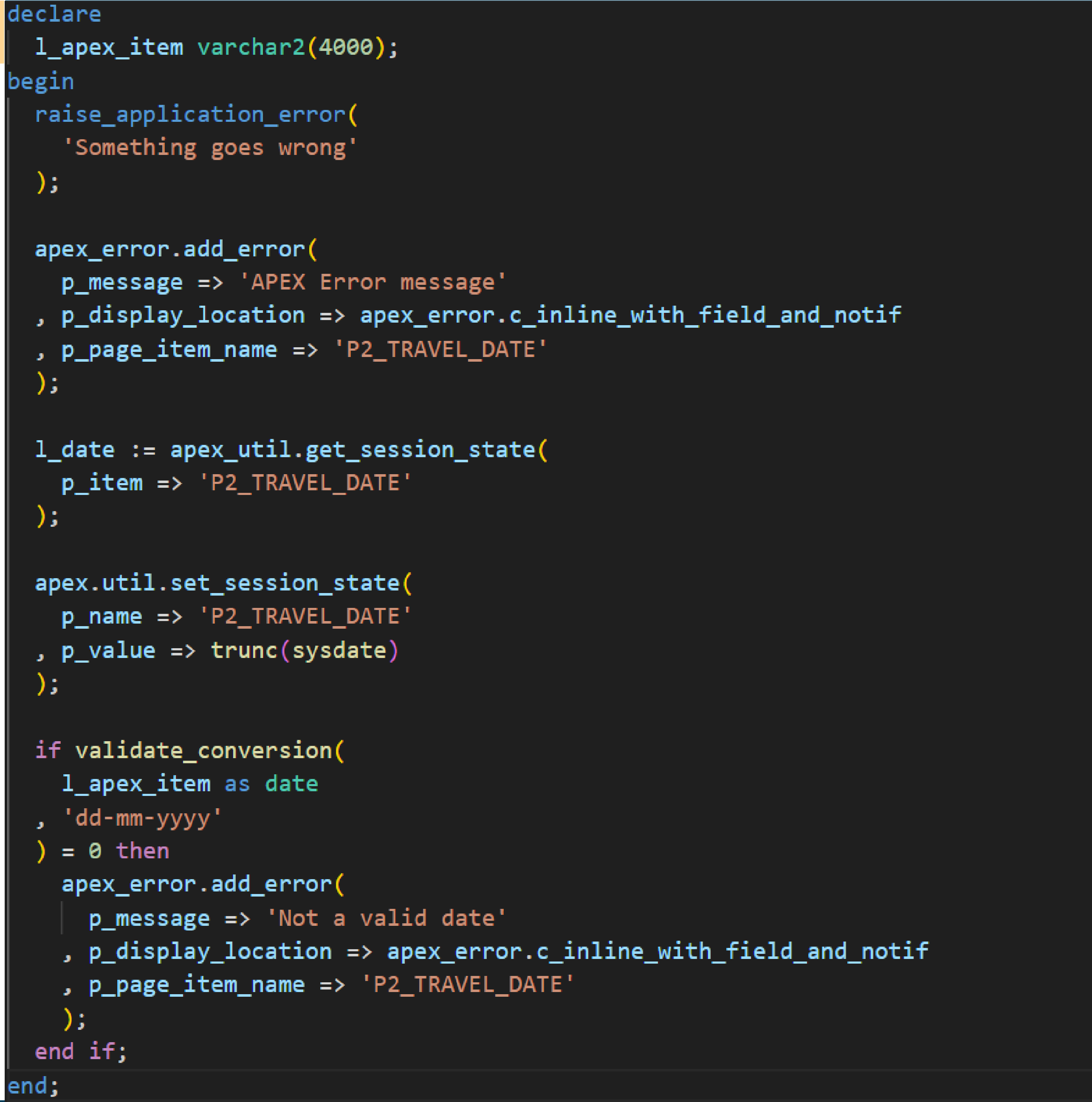
Rows returned
No Rows returned
Expression
PL/SQL Error
Function Body (returning Boolean)
Function Body (returning Error Text)
Item is NOT NULL
Item is NOT NULL or zero
Item is NOT zero
Item contains no spaces
Item is alphanumeric
Item is numeric
Item is a valid date
Item is a valid timestamp
Item = Value
Item != Value
Item is contained in Value
Item is NOT contained in Value
Item contains only characters specified in Value
Item contains at least one of the characters in Value

Error

Error Message	Travel date has to
Display Location	
Associated Item	P2_TRAVEL_DATE

APEX PL/SQL API

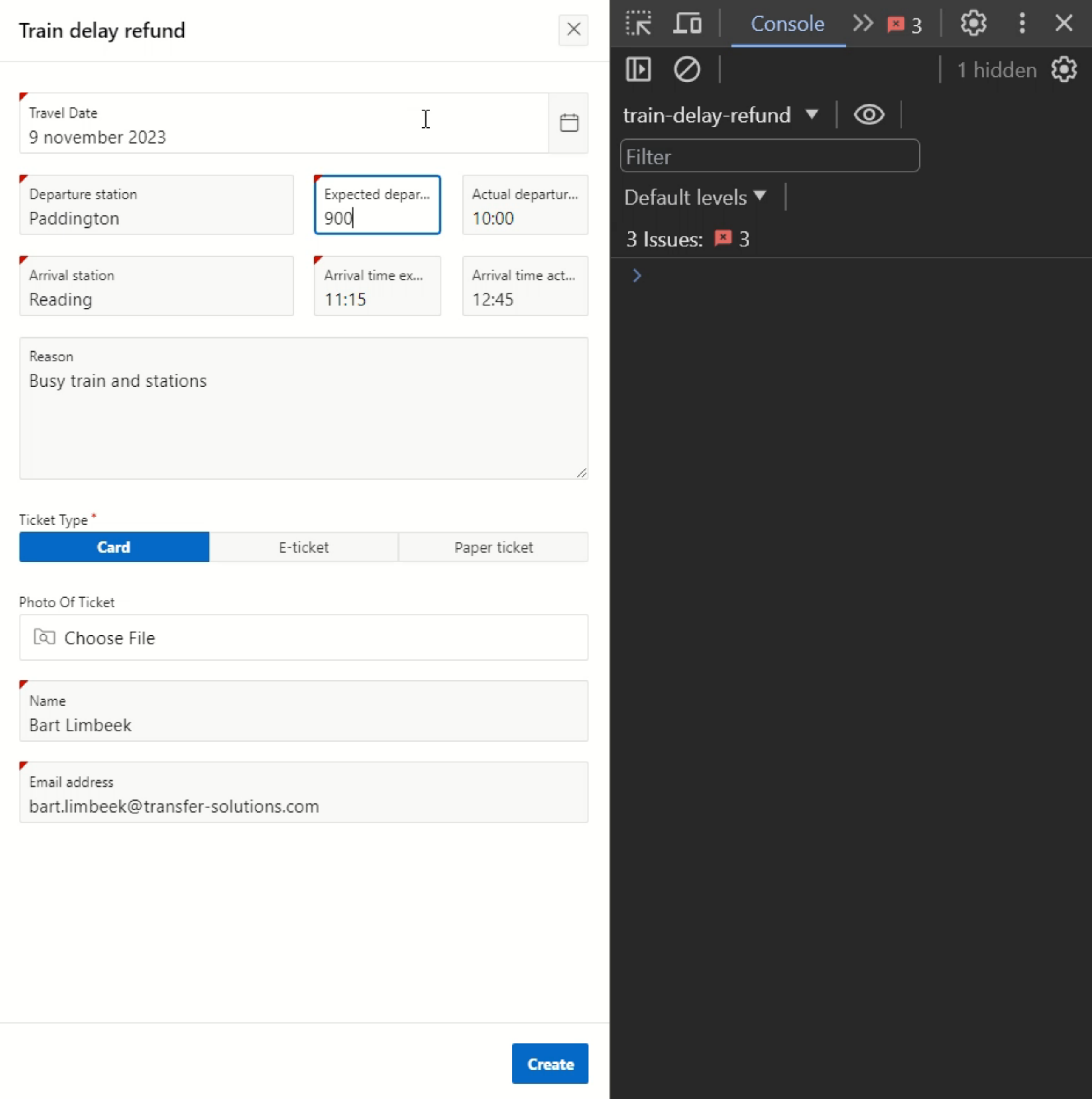
- RAISE_APPLICATION_ERROR
  Only usable once per validation & only in a notification
- APEX_ERROR.ADD_ERROR ✓
  Only usable at page submit
- APEX_UTIL.GET_SESSION_STATE ✓
- APEX_UTIL.SET_SESSION_STATE ✓
- VALIDATE_CONVERSION ✓



```
declare
  l_apex_item varchar2(4000);
begin
  raise_application_error(
    'Something goes wrong'
  );

  apex_error.add_error(
    p_message => 'APEX Error message'
  , p_display_location => apex_error.c_inline_with_field_and_notif
  , p_page_item_name => 'P2_TRAVEL_DATE'
  );

  l_date := apex_util.get_session_state(
    p_item => 'P2_TRAVEL_DATE'
  );

  apex.util.set_session_state(
    p_name => 'P2_TRAVEL_DATE'
  , p_value => trunc(sysdate)
  );

  if validate_conversion(
    l_apex_item as date
  , 'dd-mm-yyyy'
  ) = 0 then
    apex_error.add_error(
      p_message => 'Not a valid date'
    , p_display_location => apex_error.c_inline_with_field_and_notif
    , p_page_item_name => 'P2_TRAVEL_DATE'
    );
  end if;
end;
```

JavaScript API

- apex.items.PX_ITEM.getValidity().valid
  Not usable for custom validations
- apex.items.PX_ITEM.getValidationMessage()
  Not usable for custom validations
- apex.page.validate
- apex.page.validatePageItemsOnBlur
- apex.message.showErrors
- apex.message.clearErrors



Train delay refund

Travel Date: 9 november 2023

Departure station: Paddington

Expected depar...: 900

Actual departur...: 10:00

Arrival station: Reading

Arrival time ex...: 11:15

Arrival time act...: 12:45

Reason: Busy train and stations

Ticket Type *: Card | E-ticket | Paper ticket

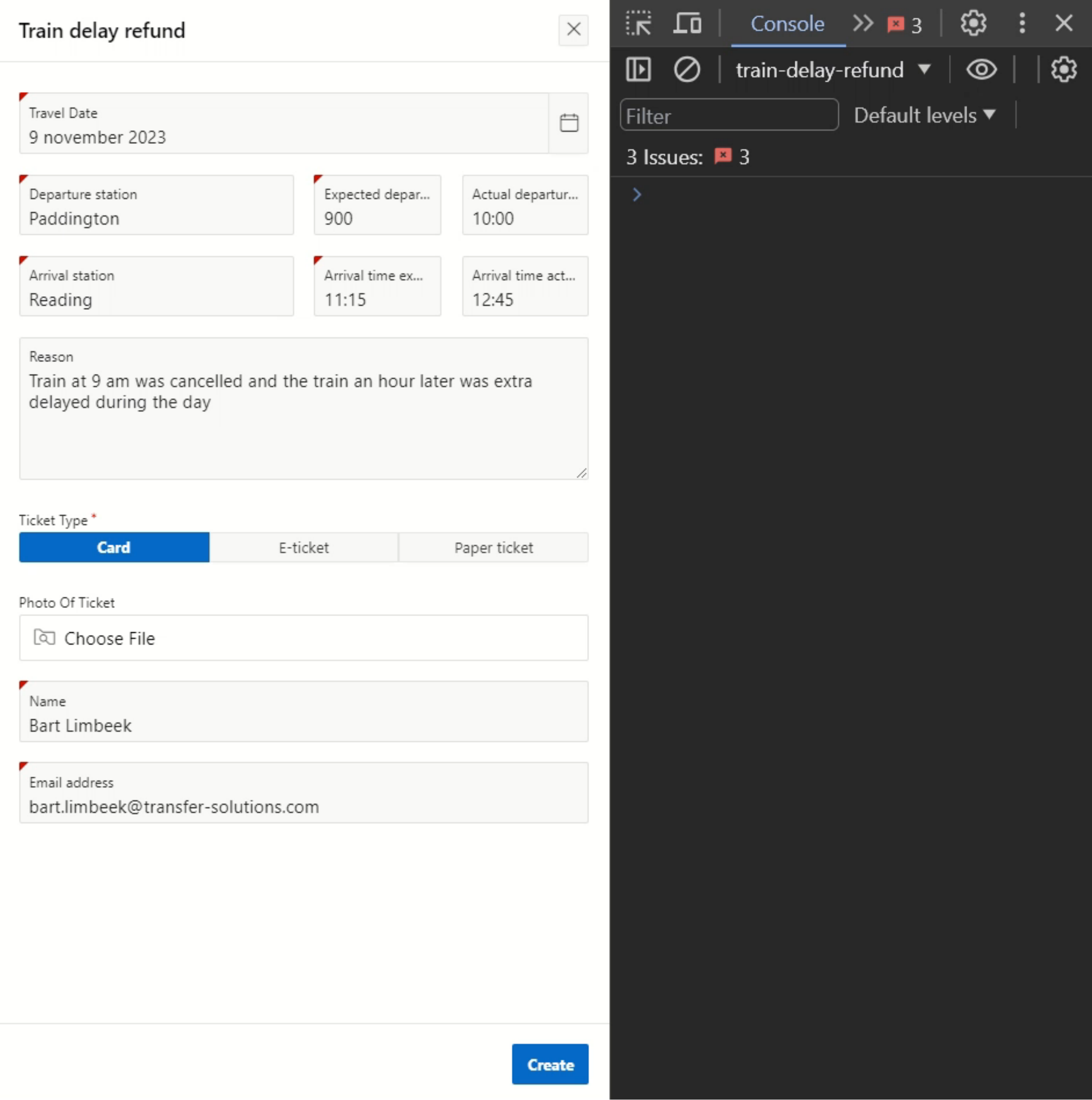
Photo Of Ticket: Choose File

Name: Bart Limbeek

Email address: bart.limbeek@transfer-solutions.com

JavaScript API

- apex.items.PX_ITEM.getValidity().valid
  Not usable for custom validations
- apex.items.PX_ITEM.getValidationMessage()
  Not usable for custom validations
- apex.page.validate
  Not usable for custom validations
- apex.page.validatePageItemsOnBlur
  Only valid at required fields, not documented
- apex.message.showErrors
- apex.message.clearErrors



Train delay refund

Travel Date 9 november 2023		
Departure station Paddington	Expected depar... 900	Actual departur... 10:00
Arrival station Reading	Arrival time ex... 11:15	Arrival time act... 12:45

Reason
Train at 9 am was cancelled and the train an hour later was extra delayed during the day

Ticket Type *
Card | E-ticket | Paper ticket

Photo Of Ticket
Choose File

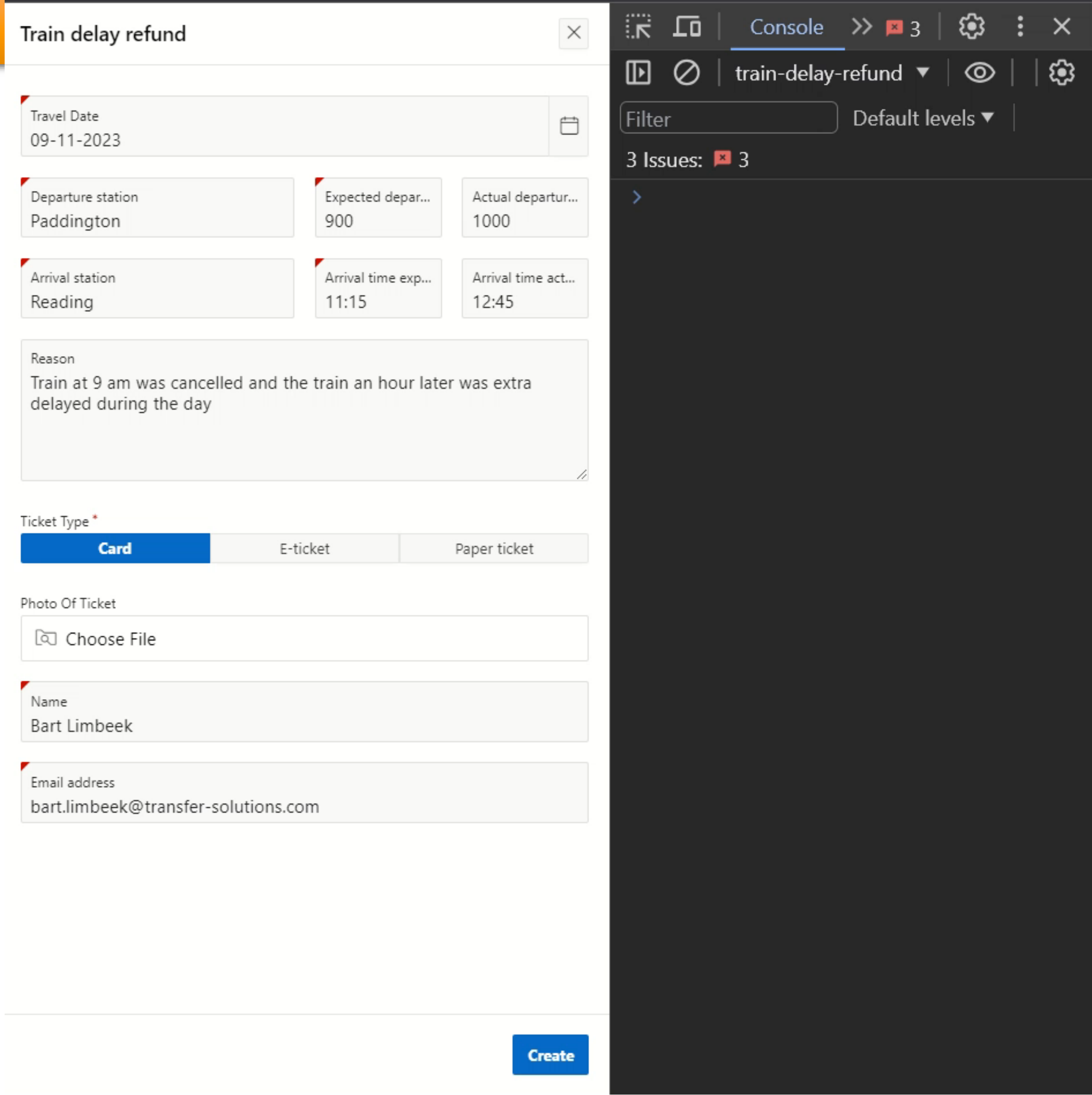
Name
Bart Limbeek

Email address
bart.limbeek@transfer-solutions.com

Create

JavaScript API

- apex.items.PX_ITEM.getValidity().valid
  Not usable for custom validations
- apex.items.PX_ITEM.getValidationMessage()
  Not usable for custom validations
- apex.page.validate
  Not usable for custom validations
- apex.page.validatePageItemsOnBlur
  Only valid at required fields, not documented
- ➡ apex.message.showErrors ✓
- ➡ apex.message.clearErrors ✓



Train delay refund

Travel Date: 09-11-2023

Departure station: Paddington

Expected depar...: 900

Actual departur...: 1000

Arrival station: Reading

Arrival time exp...: 11:15

Arrival time act...: 12:45

Reason: Train at 9 am was cancelled and the train an hour later was extra delayed during the day

Ticket Type *: Card | E-ticket | Paper ticket

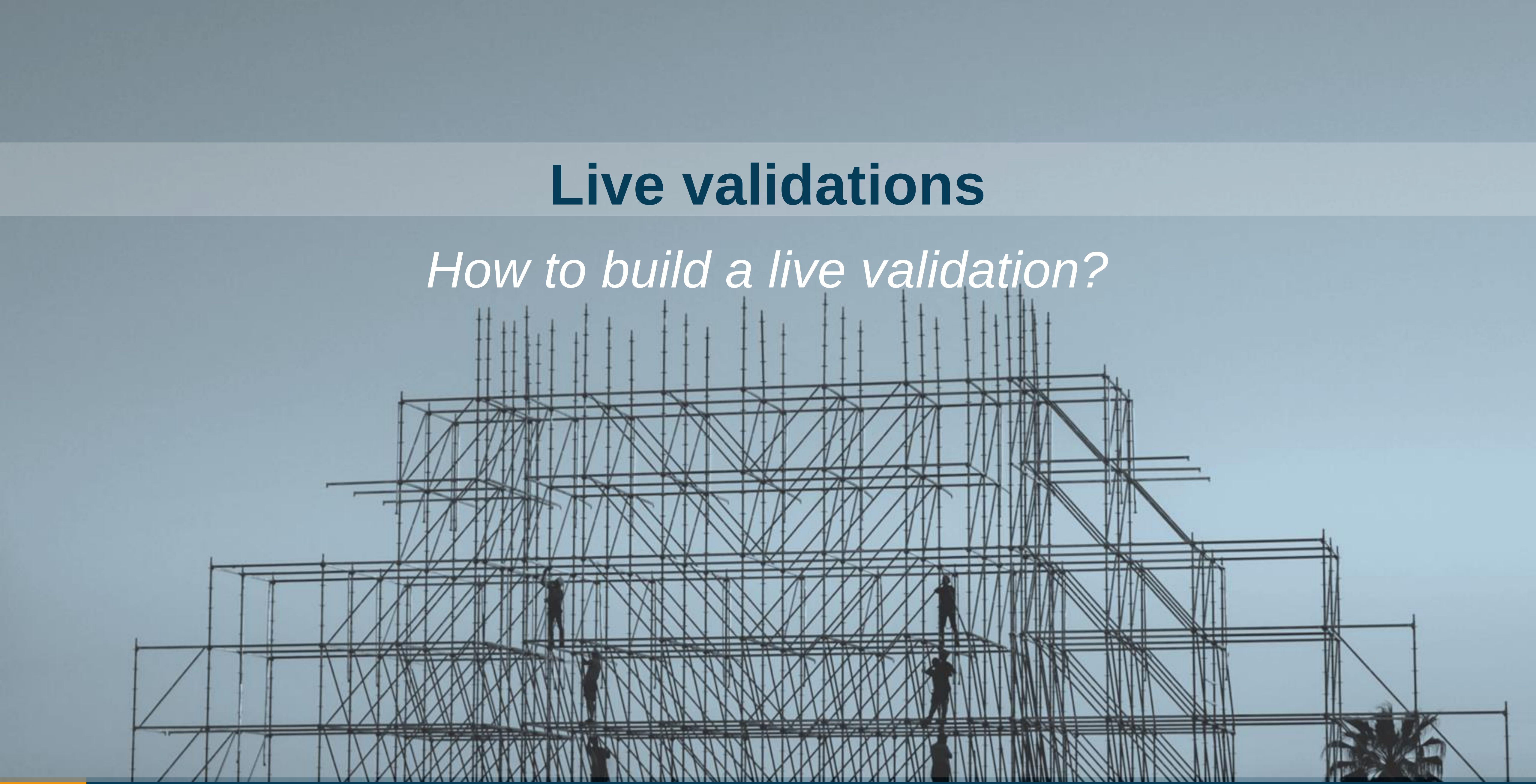
Photo Of Ticket: Choose File

Name: Bart Limbeek

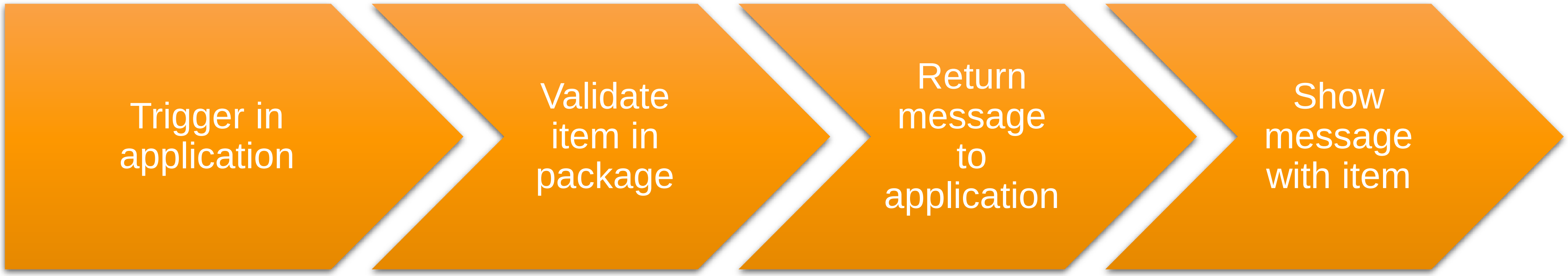
Email address: bart.limbeek@transfer-solutions.com

Live validations

How to build a live validation?



Solution for direct checks of custom validations



Trigger in application

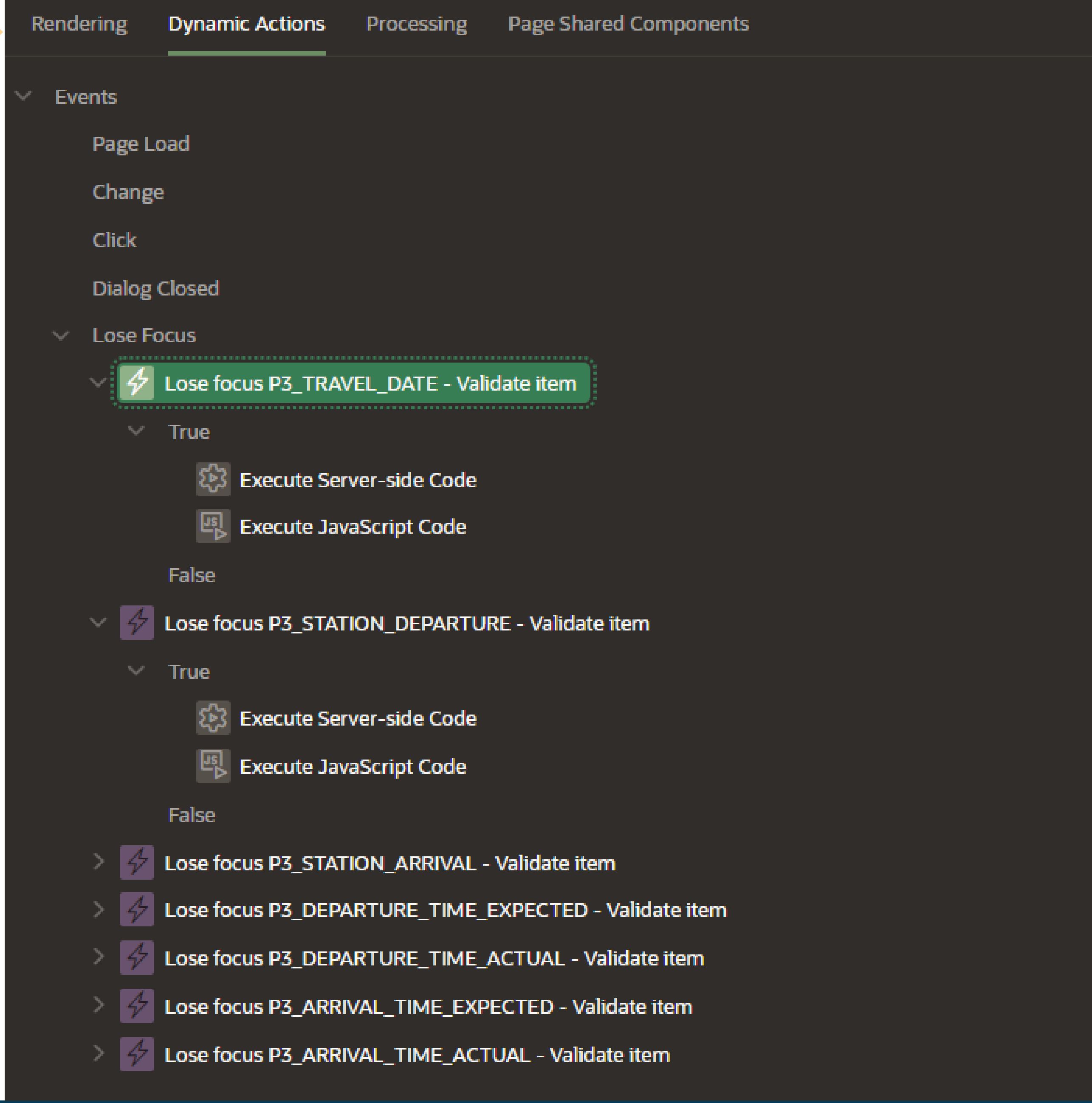
Validate item in package

Return message to application

Show message with item

Trigger in application

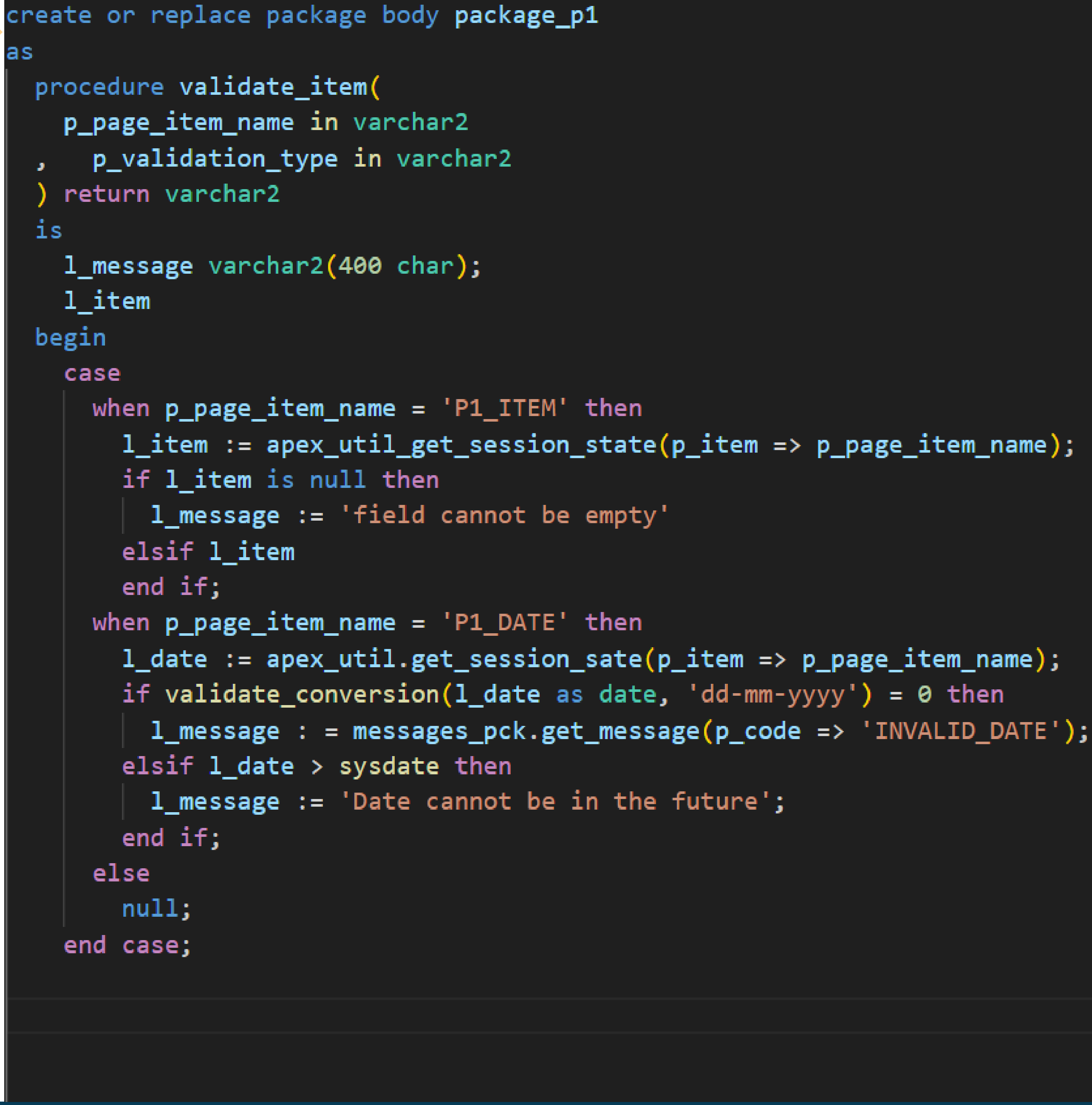
- Dynamic action
- Lose focus
- Submit items


Rendering
Dynamic Actions
Processing
Page Shared Components
Events
Page Load
Change
Click
Dialog Closed
Lose Focus
Lose focus P3_TRAVEL_DATE - Validate item
True
Execute Server-side Code
Execute JavaScript Code
False
Lose focus P3_STATION_DEPARTURE - Validate item
True
Execute Server-side Code
Execute JavaScript Code
False
Lose focus P3_STATION_ARRIVAL - Validate item
Lose focus P3_DEPARTURE_TIME_EXPECTED - Validate item
Lose focus P3_DEPARTURE_TIME_ACTUAL - Validate item
Lose focus P3_ARRIVAL_TIME_EXPECTED - Validate item
Lose focus P3_ARRIVAL_TIME_ACTUAL - Validate item

Trigger Validate Return Show

Validate item in package

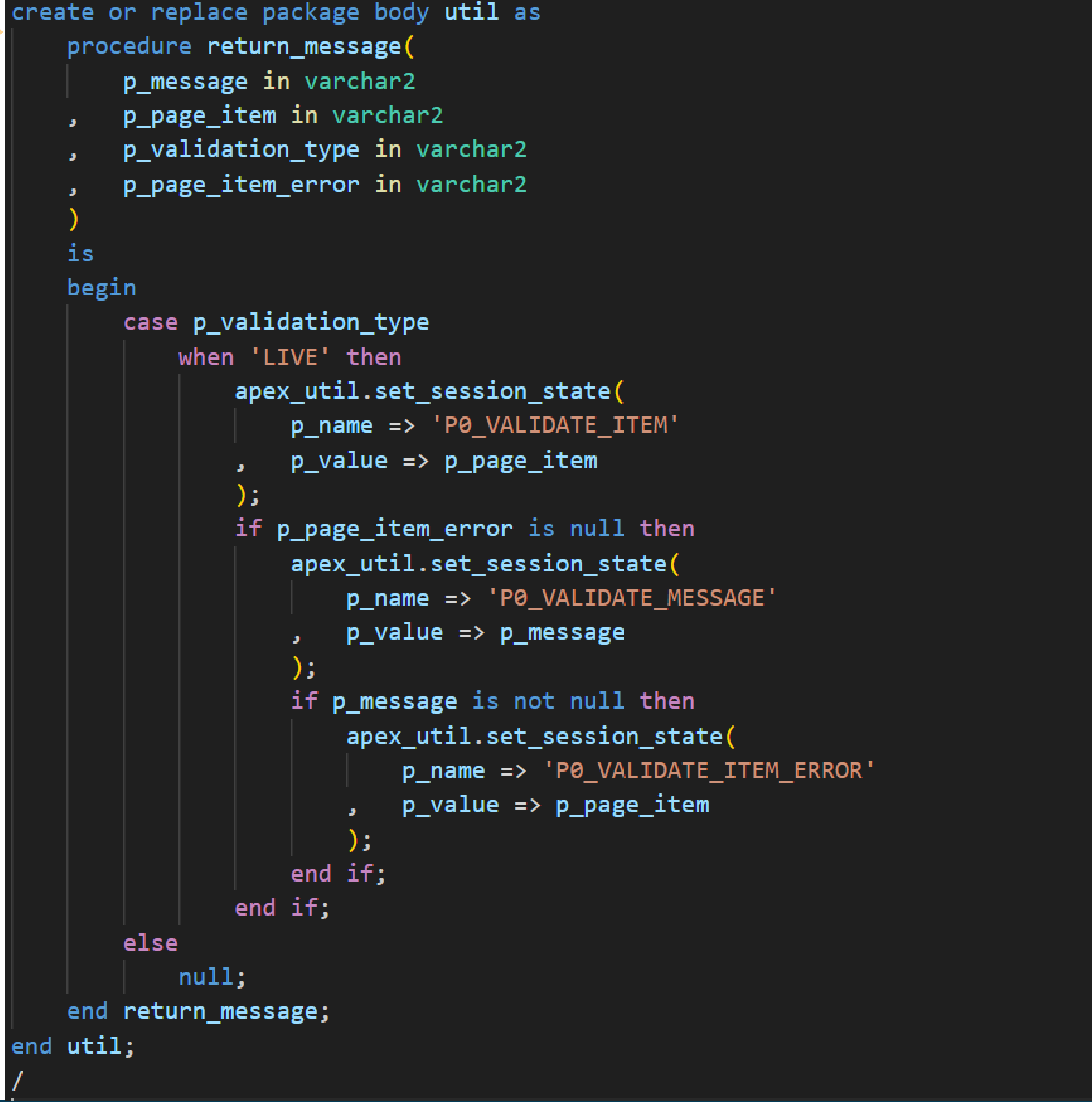
- Page package
- 1 Procedure validate_item
- Case statement
- Multiple checks per item possible
- Every validation needs a dynamic action as trigger



```
create or replace package body package_p1
as
 procedure validate_item(
   p_page_item_name in varchar2
 ,   p_validation_type in varchar2
 ) return varchar2
 is
   l_message varchar2(400 char);
   l_item
 begin
   case
     when p_page_item_name = 'P1_ITEM' then
       l_item := apex_util_get_session_state(p_item => p_page_item_name);
       if l_item is null then
         l_message := 'field cannot be empty'
       elsif l_item
       end if;
     when p_page_item_name = 'P1_DATE' then
       l_date := apex_util.get_session_sate(p_item => p_page_item_name);
       if validate_conversion(l_date as date, 'dd-mm-yyyy') = 0 then
         l_message : = messages_pck.get_message(p_code => 'INVALID_DATE');
       elsif l_date > sysdate then
         l_message := 'Date cannot be in the future';
       end if;
     else
       null;
   end case;
```

Return message to application

- Message and Item
- Global items
  - Hidden
  - Value protected must be turned off
- Return message procedure
- Only 1 procedure needed for app

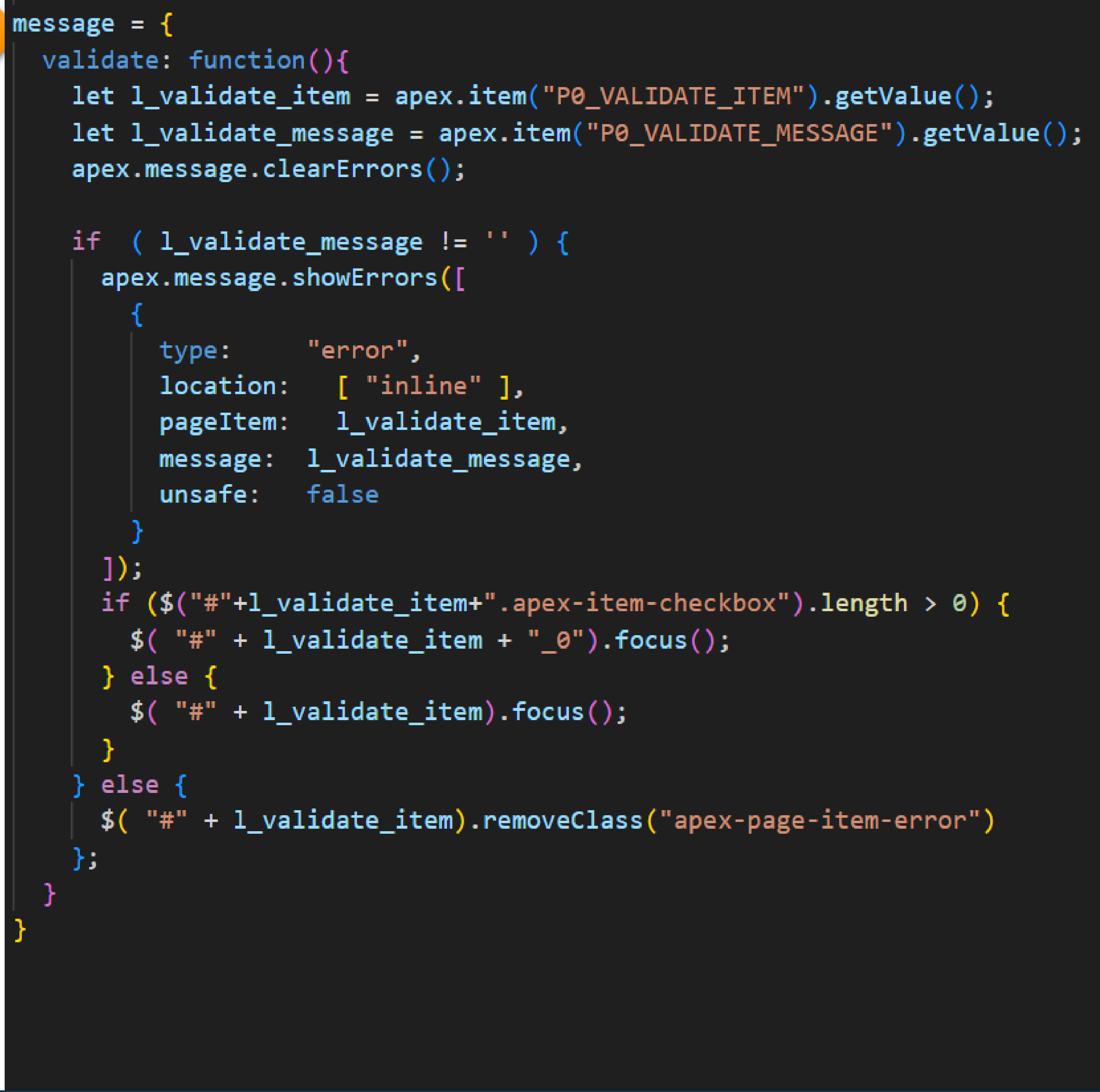


```
create or replace package body util as
    procedure return_message(
        p_message in varchar2
    ,   p_page_item in varchar2
    ,   p_validation_type in varchar2
    ,   p_page_item_error in varchar2
    )
    is
    begin
        case p_validation_type
            when 'LIVE' then
                apex_util.set_session_state(
                    p_name => 'P0_VALIDATE_ITEM'
                ,   p_value => p_page_item
                );
                if p_page_item_error is null then
                    apex_util.set_session_state(
                        p_name => 'P0_VALIDATE_MESSAGE'
                    ,   p_value => p_message
                    );
                    if p_message is not null then
                        apex_util.set_session_state(
                            p_name => 'P0_VALIDATE_ITEM_ERROR'
                        ,   p_value => p_page_item
                        );
                    end if;
                end if;
        else
            null;
    end return_message;
end util;
/
```

Trigger › Validate › Return › Show

Show message

- JavaScript function
- Get values from global items
- Clear errors all existing errors
- Show error at item
- Focus to the original element
- Call this function in every dynamic action

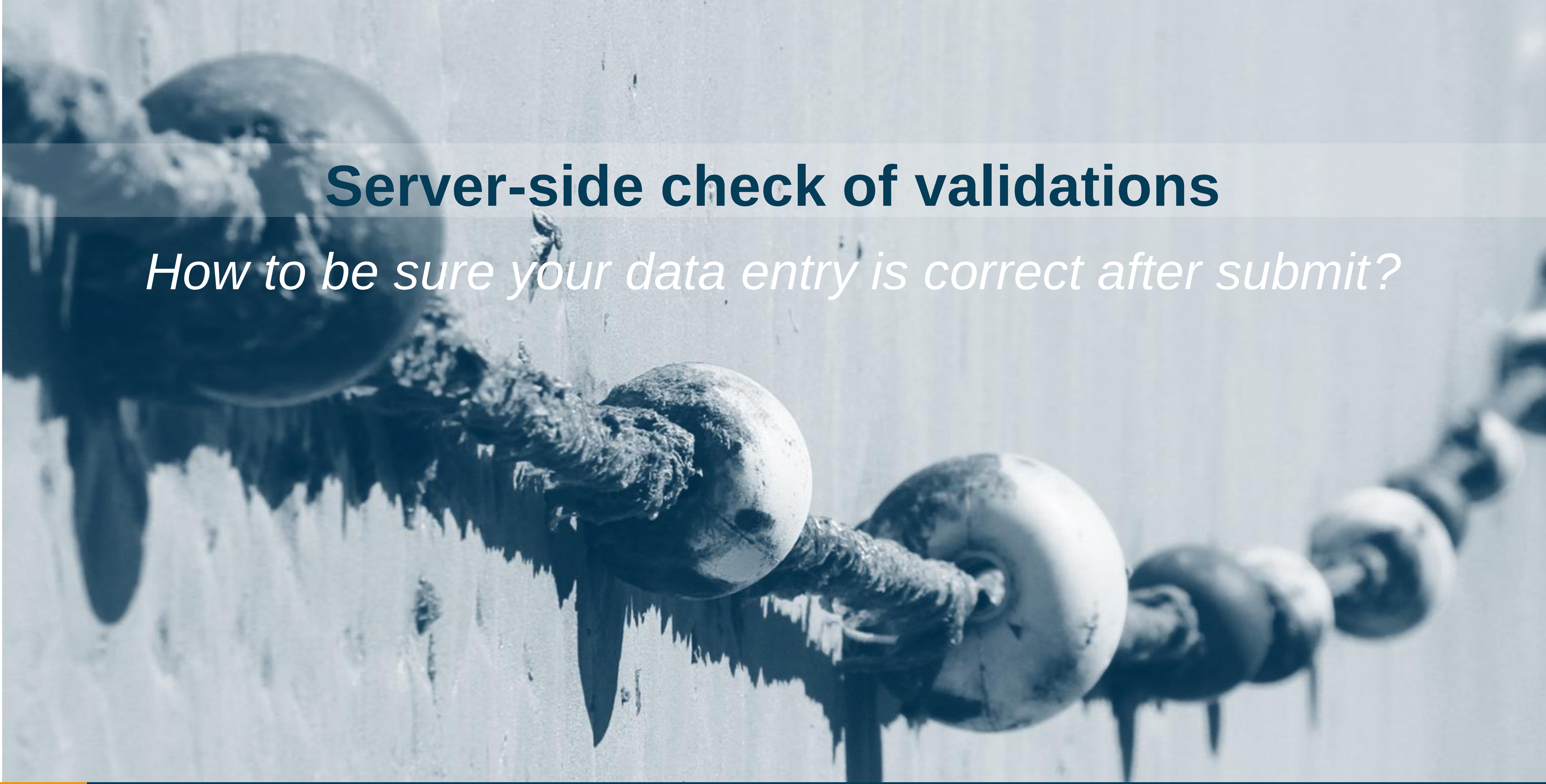


```
message = {
  validate: function(){
    let l_validate_item = apex.item("P0_VALIDATE_ITEM").getValue();
    let l_validate_message = apex.item("P0_VALIDATE_MESSAGE").getValue();
    apex.message.clearErrors();

    if  ( l_validate_message != '' ) {
      apex.message.showErrors([
        {
          type:     "error",
          location:   [ "inline" ],
          pageItem:   l_validate_item,
          message:  l_validate_message,
          unsafe:   false
        }
      ]);
      if ($("#"+l_validate_item+".apex-item-checkbox").length > 0) {
        $( "#" + l_validate_item + "_0").focus();
      } else {
        $( "#" + l_validate_item).focus();
      }
    } else {
      $( "#" + l_validate_item).removeClass("apex-page-item-error")
    };
  }
}
```

DEMO

Server-side check of validations

How to be sure your data entry is correct after submit?



(Re)validate on server-side

Trigger in application

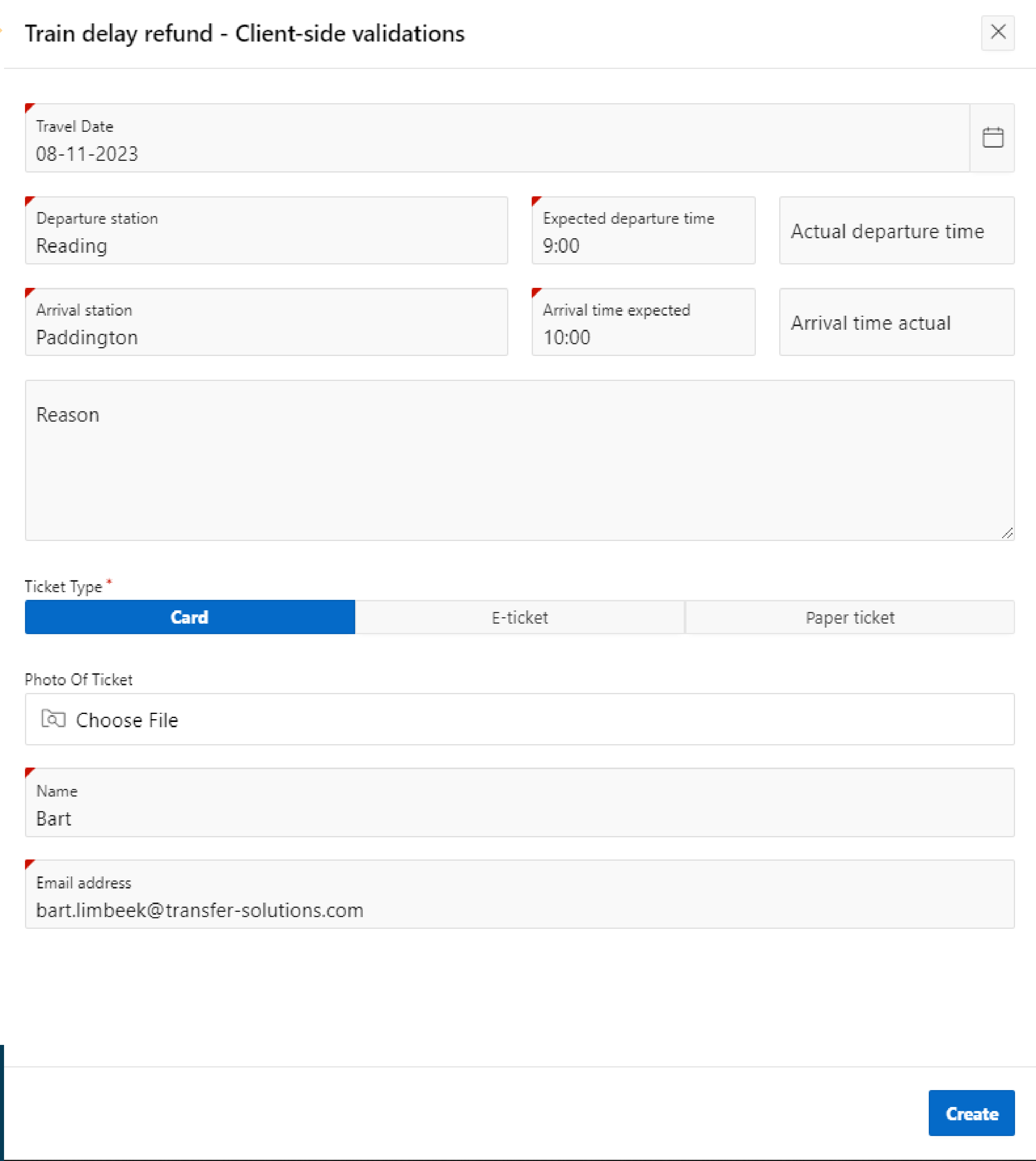
Validate in package

Return & show message

Trigger | Validate | Return & show

Trigger in application

- Submit page



Train delay refund - Client-side validations

Travel Date: 08-11-2023		
Departure station: Reading	Expected departure time: 9:00	Actual departure time
Arrival station: Paddington	Arrival time expected: 10:00	Arrival time actual

Reason

Ticket Type *: [✓ Card] E-ticket Paper ticket

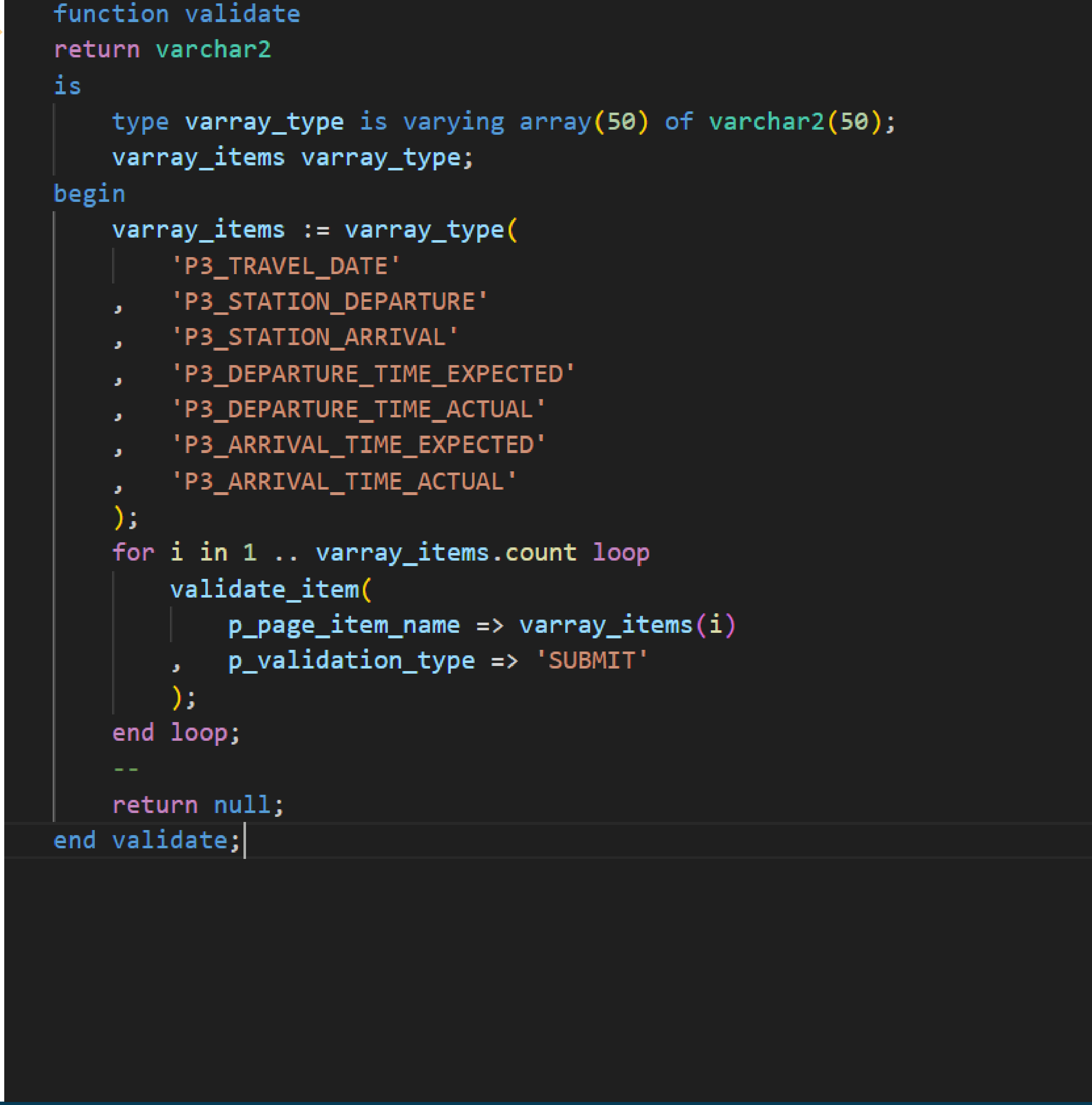
Photo Of Ticket: Choose File

Name: Bart

Email address: bart.limbeek@transfer-solutions.com

Validate item in package

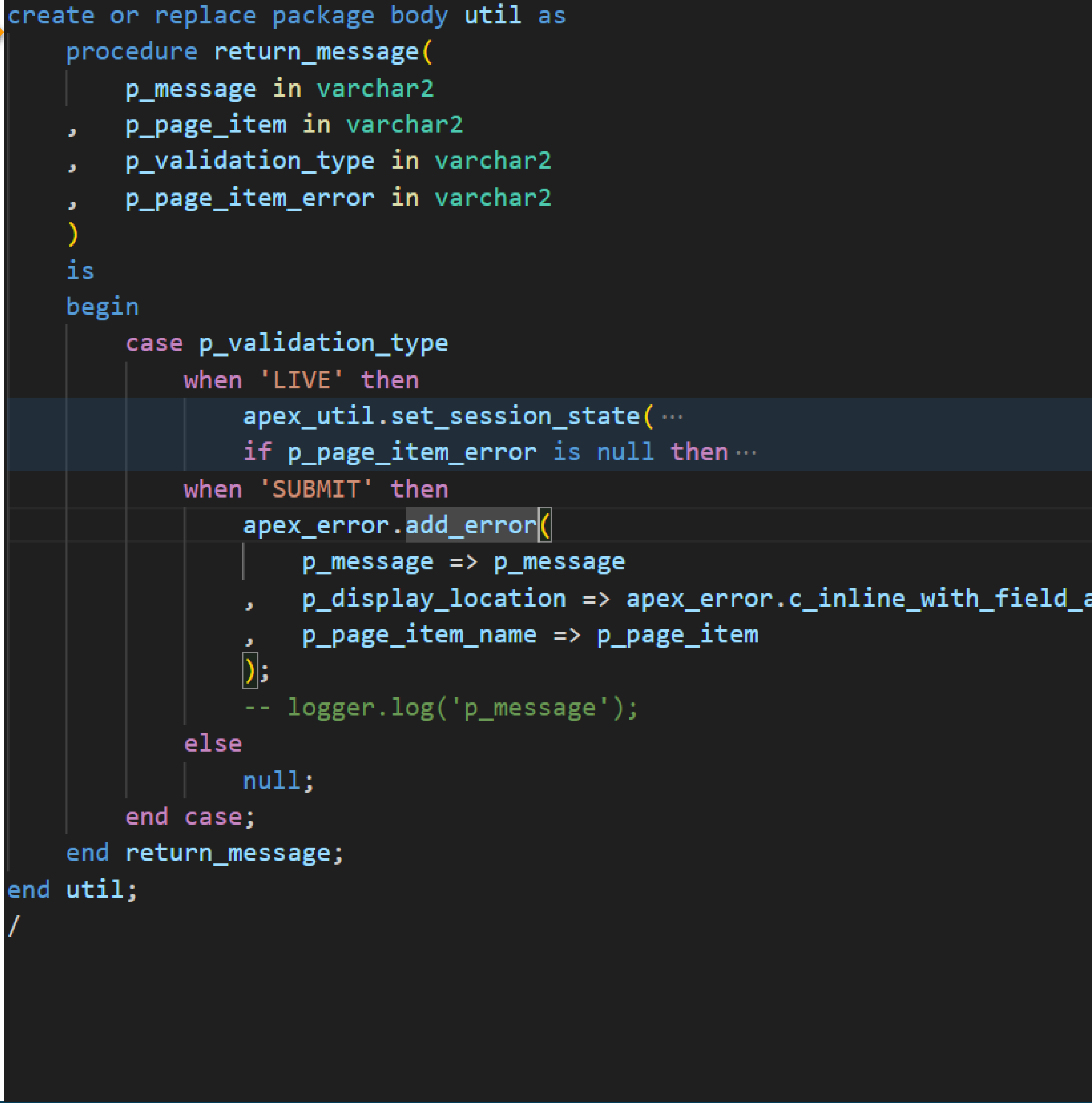
- Page package
- Function
- Re-use validate_item procedure
- Loop through all validations
- Return null, why?



```
function validate
return varchar2
is
    type varray_type is varying array(50) of varchar2(50);
    varray_items varray_type;
begin
    varray_items := varray_type(
        'P3_TRAVEL_DATE'
    ,   'P3_STATION_DEPARTURE'
    ,   'P3_STATION_ARRIVAL'
    ,   'P3_DEPARTURE_TIME_EXPECTED'
    ,   'P3_DEPARTURE_TIME_ACTUAL'
    ,   'P3_ARRIVAL_TIME_EXPECTED'
    ,   'P3_ARRIVAL_TIME_ACTUAL'
    );
    for i in 1 .. varray_items.count loop
        validate_item(
            p_page_item_name => varray_items(i)
        ,   p_validation_type => 'SUBMIT'
        );
    end loop;
    --
    return null;
end validate;
```

Return and show message

- Expansion on util.return_message
- APEX_ERROR
- Optional for logging



```
create or replace package body util as
  procedure return_message(
    p_message in varchar2
  , p_page_item in varchar2
  , p_validation_type in varchar2
  , p_page_item_error in varchar2
  )
  is
  begin
    case p_validation_type
      when 'LIVE' then
        apex_util.set_session_state(⋯
        if p_page_item_error is null then⋯
      when 'SUBMIT' then
        apex_error.add_error(
          p_message => p_message
        , p_display_location => apex_error.c_inline_with_field_a
        , p_page_item_name => p_page_item
        );
        -- logger.log('p_message');
      else
        null;
    end case;
  end return_message;
end util;
/
```

TRANSFER SOLUTIONS

DEMO

Conclusion & discussion

What do I need and

what else can I do with it?

What is needed to use in application

App

- 1 JS function
- 1 Util validate function
- 3 Global items

Page

- Validate_item procedure
- Validate procedure

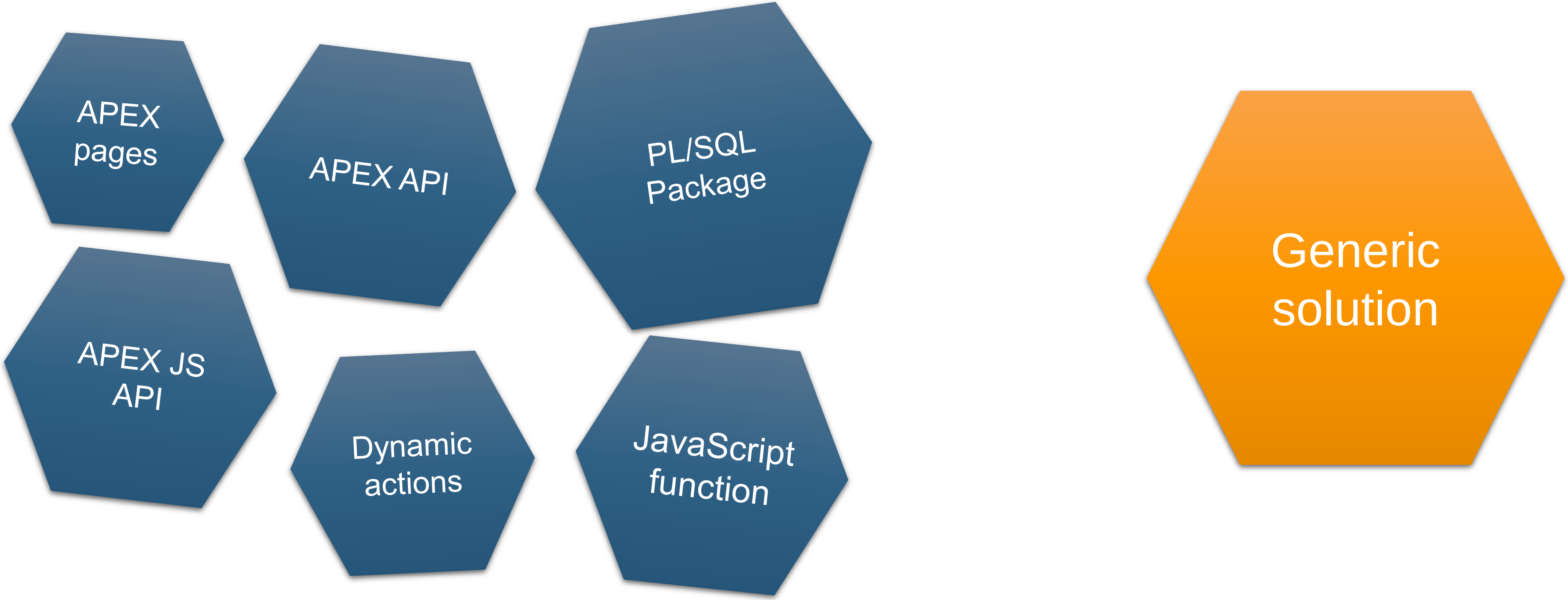
Item

- Dynamic action
- Check for validate item
- Recall item in validate function

Discussion

- Try to avoid to use validations
  - Select lists
  - Show formats for times & dates
- Also usable for warnings
  - Extra addition to validate_item
  - Javascript function to show message

Building blocks



APEX pages

APEX API

PL/SQL Package

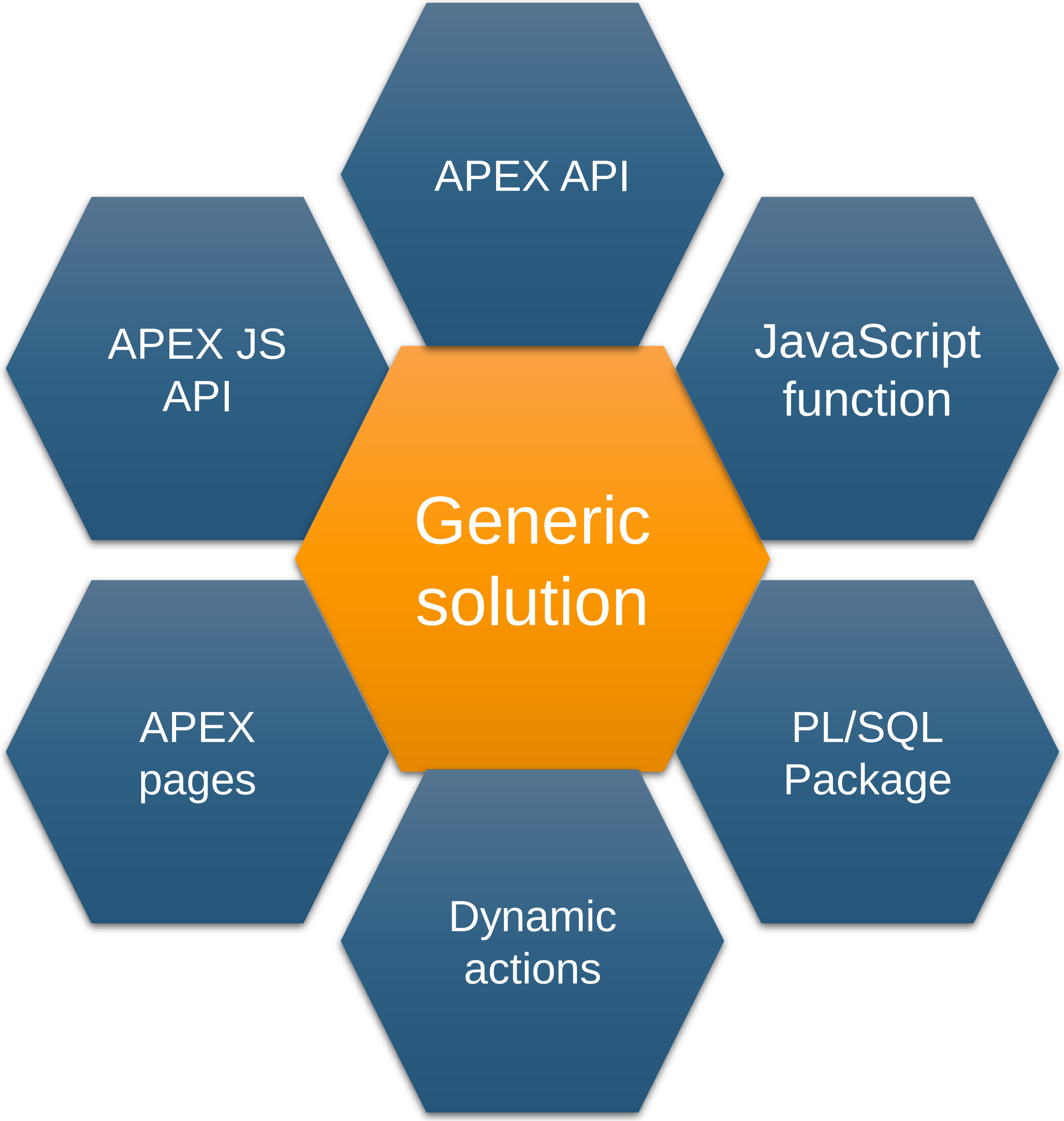
APEX JS API

Dynamic actions

JavaScript function

Generic solution

Connection



Generic solution

APEX API

JavaScript function

PL/SQL Package

Dynamic actions

APEX pages

APEX JS API

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Questions?

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https://github.com/bart-limbeek/live_validations