

RESTful APIs for web applications

Abstracting business and system
complexities to make our web partners happy

Room&Board



Who are we?

- A national furniture retailer with 22 stores
- More than 90% of our products are made in the USA (including the Twin Cities & Duluth)
- Timeless, modern design
- We care deeply about sustainability and exceptional customer service
- SAP team of 12
- Web team of 21

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Why did the SAP consultant go broke?

Because he kept trying to debug his wallet!



Why did the SAP project manager go to the beach?

To get away from all the sandboxes!



In the old days, our web team:

- Called SAP via SOAP (XML)
- Dealt with SAP technical data terminology
- Had to put up with how SAP defined data relationships
- Did not like working with SAP

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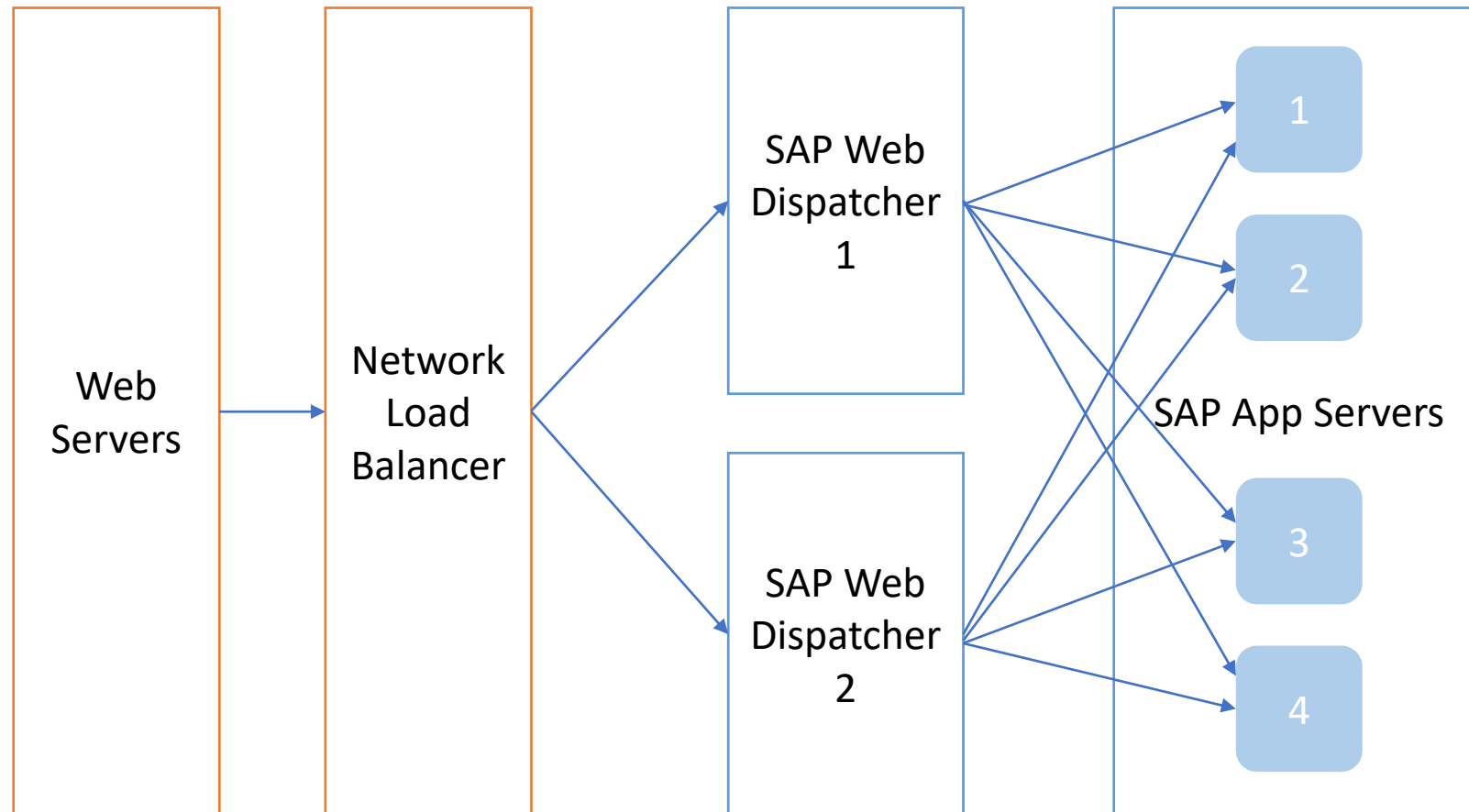
Now, the web team:

- Calls SAP via REST APIs (JSON)
- Works with mutually agreed upon terminology (i.e. orderNumber, articleNumber, billingAddress)
- Co-designs the data relationships
- Appreciates what SAP does for them

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Basic Architecture



Handling web requests

All web calls are funneled through a class that:

- Starts a log of the call
- Interprets where to send the request
- Transforms various http data to minimize duplicate work

ZTREST_TRAFFIC: Display of Entries Found

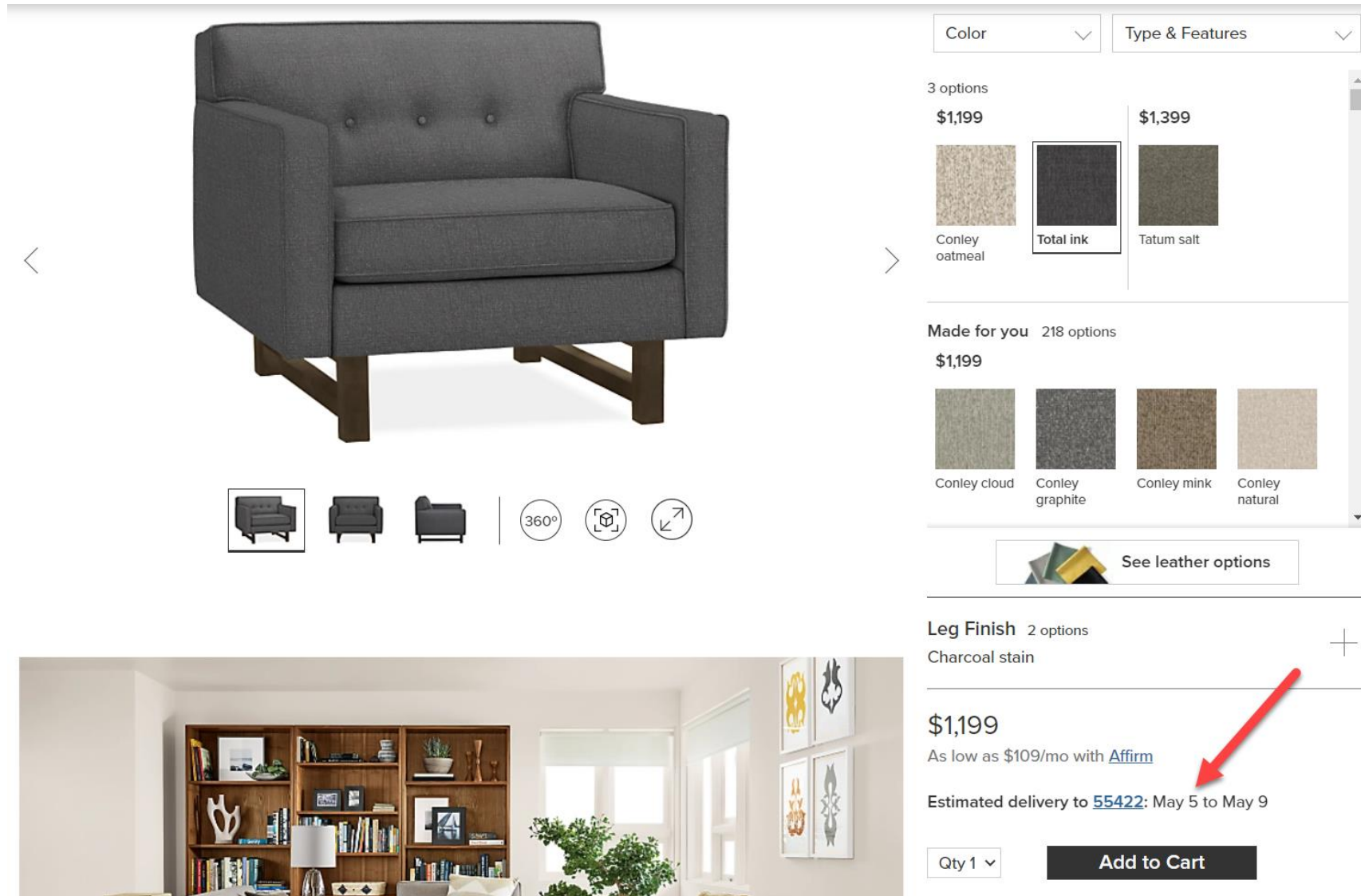
Search in Table: ZTREST_TRAFFIC Function module names for where to route REST calls

Number of hits: 65

Runtime: 0 Maximum no. of hits: 500

REST Resource	Method	Object Type Name	Interface Component	Log Type
ORDERS/~/AVAILABLE-PAYMENT-TOKENS	GET	ZCL_REST_PAYMENTS	GET_TOKENS_BY_ORDER	PAYMENT_REFUND
ORDERS/~/AVAILABLE-REFUND-METHODS	GET	ZCL_REST_PAYMENTS	GET_AVAILABLE_REFUND_METHO...	PAYMENT_REFUND
ORDERS/~/DELIVERY-GROUPS/~/	PATCH	ZCL_REST_DELIVERY	UPDATE_DELIVERY_DATE_V2	DELIVERY
ORDERS/~/DELIVERY-GROUPS/~/ESTIMATE-BALANCE-DUE-TO...	GET	ZCL_REST_ORDER	ESTIMATE_BALANCE_DUE	ORDER_STATUS
ORDERS/~/ESTIMATE-FEES	POST	ZCL_REST_ORDER_CHANGE	ESTIMATE_FEES	ORDER_CREATE_EDIT
ORDERS/~/ESTIMATE-TAXES	POST	ZCL_REST_ORDER_CHANGE	ESTIMATE_TAX	TAX
ORDERS/~/IN-STOCK-BALANCE-DUE	GET	ZCL_REST_ORDER	IN_STOCK_BALANCE_DUE	ORDER_STATUS
ORDERS/~/PAYMENTS-REFUNDS	GET	ZCL_REST_PAYMENTS	GET_PAYMENTS_REFUNDS_BY_O...	PAYMENT_REFUND
ORDERS/~/RETURN	POST	ZCL_REST_RETURN_CREATE	CREATE_RETURN	ORDER_CREATE_EDIT
ORDERS/~/STATUS	GET	ZCL_REST_ORDER_HISTORY	GET_ORDER_STATUS	ORDER_STATUS
ORDERS/WEB/~/STATUS	GET	ZCL_REST_WEB_ORDER	GET_WEB_ORDER_STATUS	ORDER_STATUS
OUTPUTS/ORDER-CONFIRMATION	POST	ZCL_REST_ORDER_HISTORY	OUTPUT_ORDER_CONFIRMATION	ACCOUNT_CONFIRMATION
PAYMENTS-REFUNDS/~/	DELETE	ZCL_REST_PAYMENTS	DELETE_UUID	PAYMENT_REFUND
PAYMENTS-REFUNDS/~/	GET	ZCL_REST_PAYMENTS	GET_AUTHS_BY_UUID	PAYMENT_REFUND
PAYMENTS-REFUNDS/~/	PATCH	ZCL_REST_PAYMENTS	PATCH_PAYMENT_OR_REFUND	PAYMENT_REFUND
PAYMENTS-REFUNDS/CARTS/~/	GET	ZCL_REST_PAYMENTS	GET_AUTHS_BY_CART	PAYMENT_REFUND
PAYMENTS-REFUNDS/PAYMENTS/~/	POST	ZCL_REST_PAYMENTS	POST_PAYMENT_OR_REFUND	PAYMENT_REFUND
PAYMENTS-REFUNDS/REFUNDS/~/	POST	ZCL_REST_PAYMENTS	POST_PAYMENT_OR_REFUND	PAYMENT_REFUND
SEARCH/CUSTOMERS	POST	ZCL_REST_CUSTOMER	POST_CUSTOMER_SEARCH	CUSTOMER
SEARCH/CUSTOMERS/CHECKOUT	POST	ZCL_REST_CUSTOMER	POST_CUSTOMER_SEARCH_CHE...	CUSTOMER
TRANSPORTATION-ZONES/~/	GET	ZCL_REST_DELIVERY	GET_TZONE	DELIVERY
V2/CHECK-STORE-INVENTORY	POST	ZCL_REST_AVAILABILITY	POST_CHECK_STORE_INVENTORY	AVAILABILITY
V2/CUSTOMERS/~/ADDRESSES	GET	ZCL_REST_CUSTOMER	GET_CUSTOMER_ADDRESSES_V3	CUSTOMER
V2/CUSTOMERS/~/ADDRESSES/BILLING/~/	GET	ZCL_REST_CUSTOMER	GET_CUSTOMER BILLING ADDR	CUSTOMER

Product Availability - Website



The image shows a product page for a grey armchair. The main image is a 3D rendering of the chair. To the right, there are two dropdown menus: 'Color' and 'Type & Features'. Below these, there are three color options: 'Conley oatmeal' (\$1,199), 'Total ink' (\$1,399), and 'Tatum salt' (\$1,399). Below that, there are four more color options: 'Conley cloud', 'Conley graphite', 'Conley mink', and 'Conley natural'. A 'See leather options' button is also present. Below the color options, there is a 'Leg Finish' section with 'Charcoal stain' as the only option. The price is listed as '\$1,199' with a note 'As low as \$109/mo with Affirm'. The estimated delivery is '55422: May 5 to May 9'. A red arrow points to the '55422' zip code. At the bottom, there is a 'Qty 1' dropdown and an 'Add to Cart' button. A lifestyle image of a living room is shown at the bottom left.

Color ▾ Type & Features ▾

3 options

\$1,199 \$1,399

Conley oatmeal Total ink Tatum salt

Made for you 218 options

\$1,199

Conley cloud Conley graphite Conley mink Conley natural

See leather options

Leg Finish 2 options

Charcoal stain +

\$1,199

As low as \$109/mo with [Affirm](#)

Estimated delivery to [55422](#): May 5 to May 9

Qty 1 ▾ **Add to Cart**

Product Availability – SAP Logs

R&B Log

Header Variables

Log Type	AVAILABILITY	to		
Created on	03/31/2023	to		
Time	06:55:00	to	07:00:00	
Created by		to		
Severity		to		
HTTP Method		to		
REST Resource		to		
HTTP URL		to		
Location		to		
Employee Number		to		
Engage Username		to		
HTTP Status Code		to		
Program Name		to		
Application Server		to		
UUID		to		

Name/Value Pairs

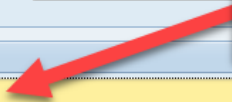
Name		Value	
Name		Value	
Name		Value	

Long Text Search

Long Text (no wildcards)	024463
Fuzzy Match Confidence (0-1)	0.95

Favorite Logs

HANA
fuzzy
search



Product Availability – SAP Logs

Log Type	Created on	Time	Loc	Duration	Emp Nbr	Favorited By	Employee Name	Method	REST Resource	Status	Program	Expires on	UUID (Universally Unique Identifier)
AVAILABILITY	03/31/2023	06:56:50	0104	0.0912180	90002		Engage Test 0104	POST	CHECK-STORE-INVENTORY	200	SAPMHTTP	04/05/2023	00505682-91b3-1edd-b3f7-63d88b27a136
AVAILABILITY	03/31/2023	06:56:50	0104	0.2578950	90002		Engage Test 0104	POST	V2/ESTIMATE-AVAILABILITY	200	SAPMHTTP	04/05/2023	00505682-91b3-1edd-b3f7-63d88b276136

Name	Value
HTTP_URL	http://[redacted]/v2/estimate-availability
RNB-CUSTOMER-ID	9192540
RNB-EMPLOYEE-NAME	Engage Test 0104
RNB-EMPLOYEE-NUMBER	90002
RNB-EMPLOYEE-USERNAME	[redacted]
RNB-LOCATION-NUMBER	0104
REST_REQUEST	{"upsltems":[],"inHomeltems":{"identifier":"1","deliveryMethod":"INH","quantityRequested":1,"zipCode":"55422-4822","articleNumb
REST_RESPONSE	{"inHomeltems":{"identifier":"1","quantityAvailable":true,"inStockDate":"20230425","availableDate":"20230429"}}}

Product Availability – SAP Log detail

```
REST_REQUEST {"upsItems": [], "inHomeItems": [{"identifier": "1", "deliveryMethod": "INH", "quantityRequested": 1, "zipCode": "55422-4822", "articleNumber": "024463", "questionsAnswers": [], "deliverFromStoreInventory": false}], "pickupItems": [], "fitCallFees": []}
```

DEV(1)/300 SAP

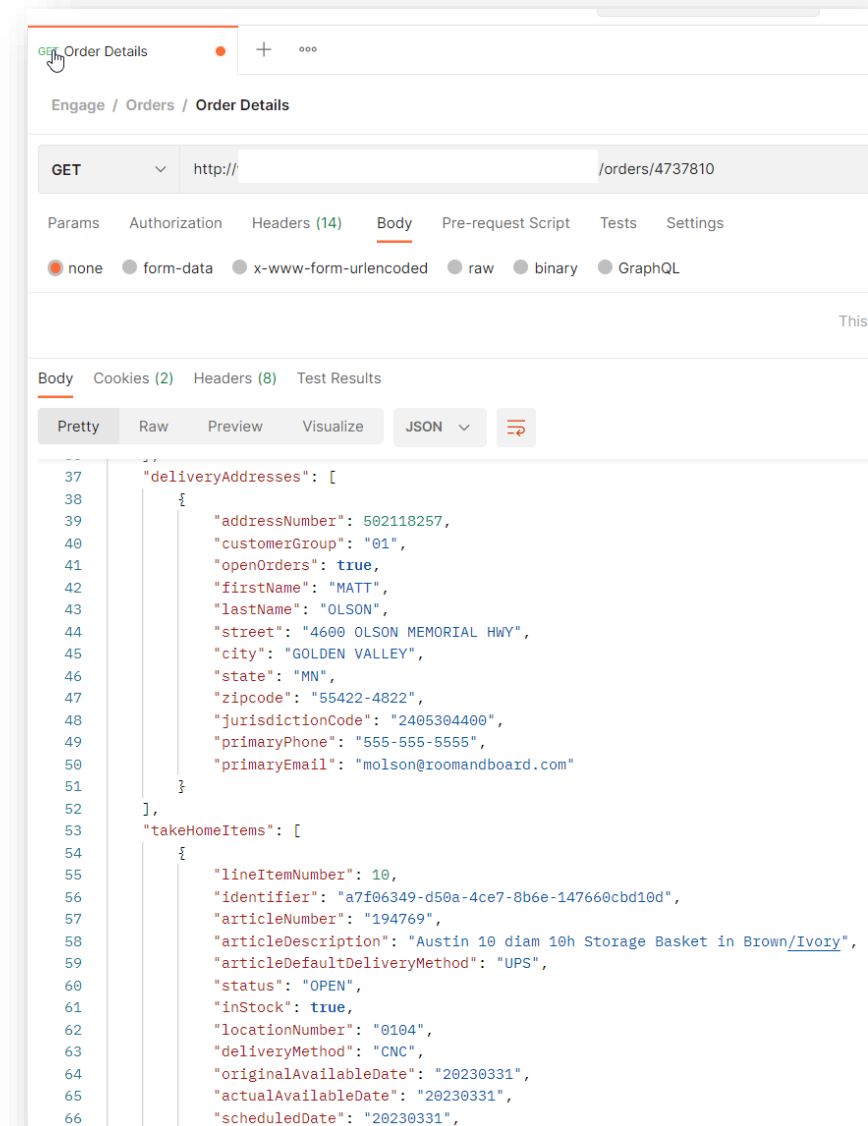
```
REST_REQUEST {"upsItems": [], "inHomeItems": [{"identifier": "1", "deliveryMethod": "INH", "quantityRequested": 1, "zipCode": "55422-4822", "articleNumber": "024463", "questionsAnswers": [], "deliverFromStoreInventory": false}], "pickupItems": [], "fitCallFees": []}
```

```
REST_RESPONSE {"inHomeItems": [{"identifier": "1", "quantityAvailable": true, "inStockDate": "20230425", "availableDate": "20230429"}]}
```

DEV(1)/300 SAP

Co-designed data relationships

- Web and SAP teams spent a lot of time up front discussing how to model our business objects
- Then we'd flow into agile sprints, where the SAP team would demo a resource with Postman, ask for feedback, and answer questions
- Looking at JSON examples, and providing multiple options had the best outcomes
- Using consistent naming conventions across objects led to fast adoption from the web team



The screenshot shows a Postman interface for a GET request to `http://.../orders/4737810`. The 'Body' tab is selected, displaying a JSON response. The response includes a list of 'deliveryAddresses' and a 'takeHomeItems' array. The 'takeHomeItems' array contains a single object with various attributes including 'lineItemNumber', 'identifier', 'articleNumber', 'articleDescription', 'status', 'inStock', 'locationNumber', 'deliveryMethod', 'originalAvailableDate', 'actualAvailableDate', and 'scheduledDate'.

```
37  "deliveryAddresses": [  
38  {  
39    "addressNumber": 502118257,  
40    "customerGroup": "01",  
41    "openOrders": true,  
42    "firstName": "MATT",  
43    "lastName": "OLSON",  
44    "street": "4600 OLSON MEMORIAL HWY",  
45    "city": "GOLDEN VALLEY",  
46    "state": "MN",  
47    "zipCode": "55422-4822",  
48    "jurisdictionCode": "2405304400",  
49    "primaryPhone": "555-555-5555",  
50    "primaryEmail": "molson@roomandboard.com"  
51  }  
52 ],  
53  "takeHomeItems": [  
54  {  
55    "lineItemNumber": 10,  
56    "identifier": "a7f06349-d50a-4ce7-8b6e-147660cbd10d",  
57    "articleNumber": "194769",  
58    "articleDescription": "Austin 10 diam 10h Storage Basket in Brown/Ivory",  
59    "articleDefaultDeliveryMethod": "UPS",  
60    "status": "OPEN",  
61    "inStock": true,  
62    "locationNumber": "0104",  
63    "deliveryMethod": "CNC",  
64    "originalAvailableDate": "20230331",  
65    "actualAvailableDate": "20230331",  
66    "scheduledDate": "20230331",
```


Technical Stuff

- Having a JSON -> ABAP converter was key
- “REST Traffic” table gives flexibility in rolling out new functionality
- Super class ZCL_REST:
 - Every class mapped in our “traffic” table inherits from it
 - Implements ZIF_REST interface, which ensures consistent data mapping between all the classes
 - Handles logging, error handling, and other utility-like methods which every derived class uses

REST Resource	Method	Object Type Name	Interface Component
CHECK-STORE-INVENTORY	POST	ZCL_REST_AVAILABILITY	POST_CHECK_STORE_INVEN
CODE-VALUES	GET	ZCL_REST_MISC	GET_CODE_VALUES
CUSTOMERS/&/ADDRESSES/BILLING/&/CONTACT-...	PUT	ZCL_REST_CUSTOMER	PUT_CONTACT_DETAILS
CUSTOMERS/&/ADDRESSES/DELIVERY/&/CONTAC...	PUT	ZCL_REST_CUSTOMER	PUT_CONTACT_DETAILS
CUSTOMERS/&/ADDRESSES/DELIVERY/&/NOTES	PUT	ZCL_REST_CUSTOMER	PUT_DELIVERY_ADDRESS_NO
CUSTOMERS/&/ORDERS	GET	ZCL_REST_ORDER_HISTORY_V2	GET_CUSTOMER_ORDERS
CUSTOMERS/&/ORDERS-OLD	GET	ZCL_REST_ORDER_HISTORY	GET_CUSTOMER_ORDERS
CUSTOMERS/&/ORDERS/LIST	GET	ZCL_REST_ORDER_HISTORY	CUSTOMER_ORDER_LIST
CUSTOMERS/&/PRIMARY-DELIVERY-ADDRESS/&	PUT	ZCL_REST_CUSTOMER	PUT_UPDATE_PRIMARY_DELI
CUSTOMERS/&/SUMMARY	GET	ZCL_REST_CUSTOMER	GET_CUSTOMER_SUMMARY
CUSTOMERS/CUSTOMER-NAMES	POST	ZCL_REST_CUSTOMER	POST_CUSTOMER_NAMES
DELIVERY-DATES	POST	ZCL_REST_DELIVERY	POST_DELIVERY_DATES
DELIVERY-DATES/&/&	GET	ZCL_REST_DELIVERY	GET_DELIVERY_DATES
EMPLOYEES/&/STATUS	GET	ZCL_REST_EMPLOYEE	GET_VALIDATE_DA
ESTIMATE-AVAILABILITY	POST	ZCL_REST_AVAILABILITY	POST_CHECK_WAREHOUSE_
JURISDICTION-CODES/&	GET	ZCL_REST_TAX	GET_JURISDICTION_CODES
LOCATIONS	GET	ZCL_REST_LOCATION	GET_LOCATION_LIST_V3
ORDERS	POST	ZCL_REST_ORDER_CREATE	CREATE_ORDER
ORDERS-OLD/&	GET	ZCL_REST_ORDER_HISTORY	GET_ORDER_DETAILS
ORDERS/&	GET	ZCL_REST_ORDER_HISTORY_V2	GET_ORDER_DETAILS
ORDERS/&	PATCH	ZCL_REST_ORDER_CHANGE	CHANGE
ORDERS/&/AVAILABLE-PAYMENT-TOKENS	GET	ZCL_REST_PAYMENTS	GET_TOKENS_BY_ORDER
ORDERS/&/AVAILABLE-REFUND-METHODS	GET	ZCL_REST_PAYMENTS	GET_AVAILABLE_REFUND_ME
ORDERS/&/DELIVERY-GROUPS/&	PATCH	ZCL_REST_DELIVERY	UPDATE_DELIVERY_DATE_V2
ORDERS/&/DELIVERY-GROUPS/&/ESTIMATE-BALA...	GET	ZCL_REST_ORDER	ESTIMATE_BALANCE_DUE
ORDERS/&/ESTIMATE-FEES	POST	ZCL_REST_ORDER_CHANGE	ESTIMATE_FEES
ORDERS/&/ESTIMATE-TAXES	POST	ZCL_REST_ORDER_CHANGE	ESTIMATE_TAX
ORDERS/&/IN-STOCK-BALANCE-DUE	GET	ZCL_REST_ORDER	IN_STOCK_BALANCE_DUE
ORDERS/&/PAYMENTS-REFUNDS	GET	ZCL_REST_PAYMENTS	GET_PAYMENTS_REFUNDS_B
ORDERS/&/RETURN	POST	ZCL_REST_RETURN_CREATE	CREATE_RETURN
ORDERS/&/STATUS	GET	ZCL_REST_ORDER_HISTORY	GET_ORDER_STATUS

```

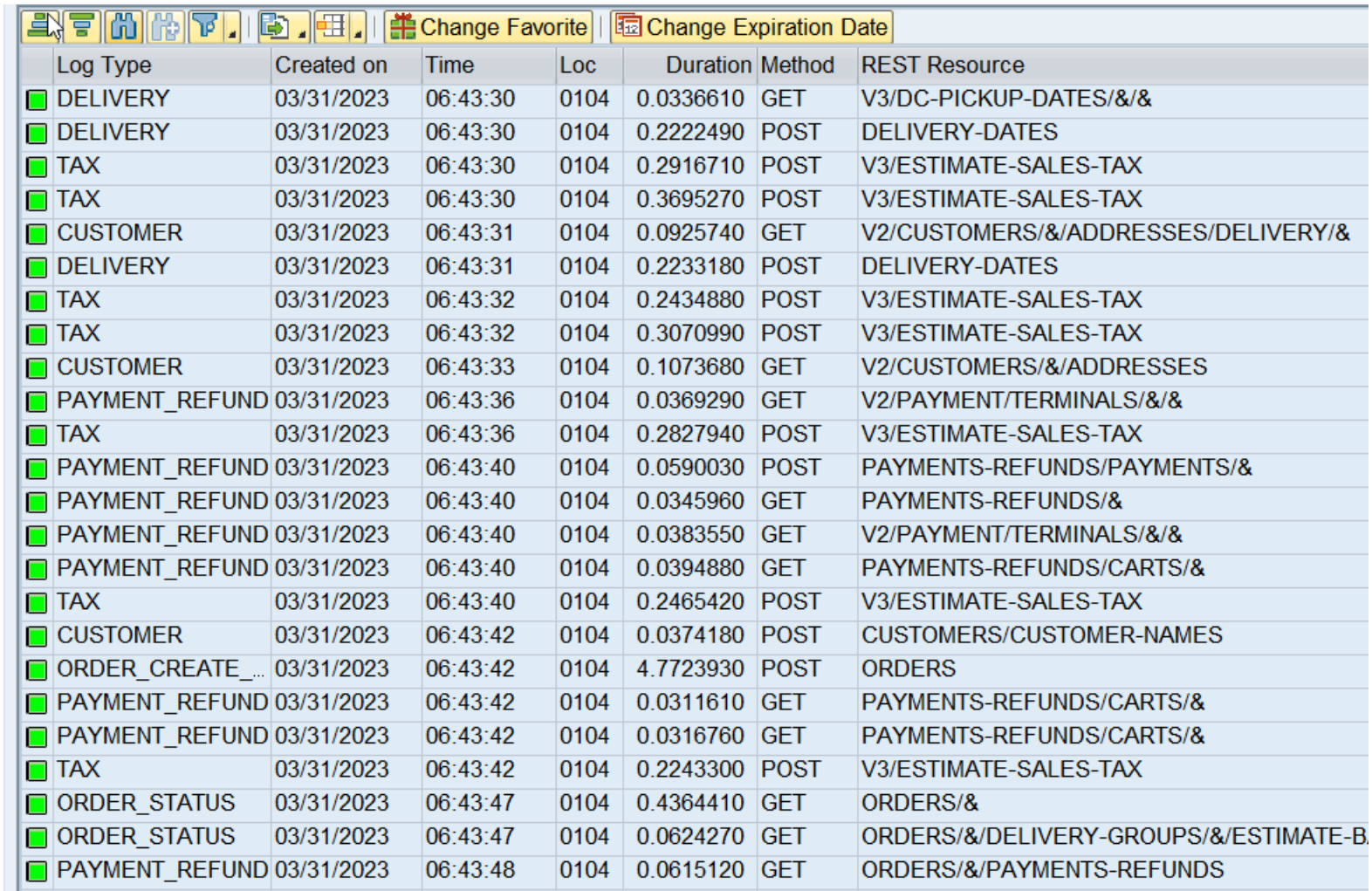
zif_rest~gs_response-json_response = zcl_json=>serialize( EXPORTING data           = ls_response_error
                                                         pretty_name   = zcl_json=>pretty_mode-camel_case
                                                         compress      = zcl_json=>c_bool-true ).

RAISE EXCEPTION TYPE zcx_rest_services EXPORTING is_rest_response = zif_rest~gs_response.

```

Technical Stuff

- Detailed logging has been critical
 - Stored JSON as 255 character chunks in database so we can use HANA fuzzy search
 - Web passes a session ID, and other header-level identifiers per call which help in filtering
 - Logging call duration and server has helped identify performance issues
 - Maintain different retention periods per log type



Log Type	Created on	Time	Loc	Duration	Method	REST Resource
DELIVERY	03/31/2023	06:43:30	0104	0.0336610	GET	V3/DC-PICKUP-DATES/~/&&
DELIVERY	03/31/2023	06:43:30	0104	0.2222490	POST	DELIVERY-DATES
TAX	03/31/2023	06:43:30	0104	0.2916710	POST	V3/ESTIMATE-SALES-TAX
TAX	03/31/2023	06:43:30	0104	0.3695270	POST	V3/ESTIMATE-SALES-TAX
CUSTOMER	03/31/2023	06:43:31	0104	0.0925740	GET	V2/CUSTOMERS/~/ADDRESSES/DELIVERY/~/&&
DELIVERY	03/31/2023	06:43:31	0104	0.2233180	POST	DELIVERY-DATES
TAX	03/31/2023	06:43:32	0104	0.2434880	POST	V3/ESTIMATE-SALES-TAX
TAX	03/31/2023	06:43:32	0104	0.3070990	POST	V3/ESTIMATE-SALES-TAX
CUSTOMER	03/31/2023	06:43:33	0104	0.1073680	GET	V2/CUSTOMERS/~/ADDRESSES
PAYMENT_REFUND	03/31/2023	06:43:36	0104	0.0369290	GET	V2/PAYMENT/TERMINALS/~/&&
TAX	03/31/2023	06:43:36	0104	0.2827940	POST	V3/ESTIMATE-SALES-TAX
PAYMENT_REFUND	03/31/2023	06:43:40	0104	0.0590030	POST	PAYMENTS-REFUNDS/PAYMENTS/~/&&
PAYMENT_REFUND	03/31/2023	06:43:40	0104	0.0345960	GET	PAYMENTS-REFUNDS/~/&&
PAYMENT_REFUND	03/31/2023	06:43:40	0104	0.0383550	GET	V2/PAYMENT/TERMINALS/~/&&
PAYMENT_REFUND	03/31/2023	06:43:40	0104	0.0394880	GET	PAYMENTS-REFUNDS/CARTS/~/&&
TAX	03/31/2023	06:43:40	0104	0.2465420	POST	V3/ESTIMATE-SALES-TAX
CUSTOMER	03/31/2023	06:43:42	0104	0.0374180	POST	CUSTOMERS/CUSTOMER-NAMES
ORDER_CREATE_...	03/31/2023	06:43:42	0104	4.7723930	POST	ORDERS
PAYMENT_REFUND	03/31/2023	06:43:42	0104	0.0311610	GET	PAYMENTS-REFUNDS/CARTS/~/&&
PAYMENT_REFUND	03/31/2023	06:43:42	0104	0.0316760	GET	PAYMENTS-REFUNDS/CARTS/~/&&
TAX	03/31/2023	06:43:42	0104	0.2243300	POST	V3/ESTIMATE-SALES-TAX
ORDER_STATUS	03/31/2023	06:43:47	0104	0.4364410	GET	ORDERS/~/&&
ORDER_STATUS	03/31/2023	06:43:47	0104	0.0624270	GET	ORDERS/~/DELIVERY-GROUPS/~/ESTIMATE-B...
PAYMENT_REFUND	03/31/2023	06:43:48	0104	0.0615120	GET	ORDERS/~/PAYMENTS-REFUNDS

Questions?

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