

Utilizing HR/Payroll APIs and 9iAS to Simplify Employee Load and Maintenance

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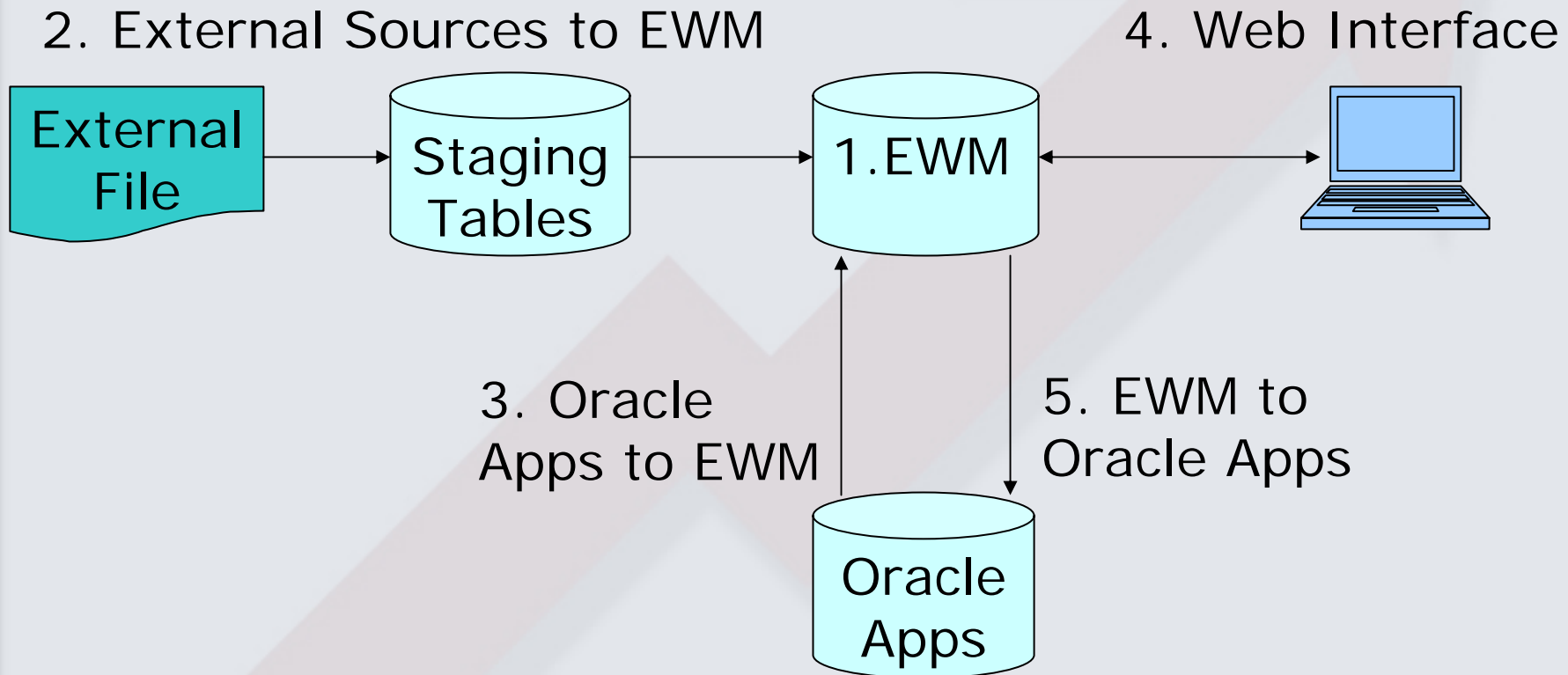
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Introduction

- Most HR/Payroll implementations require initial or periodic data loads from external systems
- In addition, HR managers often want to provide simplified web-based employee maintenance
- Maritech partnered with Procise Consulting to solve these mission critical business needs by developing Employee Web Maintenance (EWM) system
- In this paper, we will describe EWM's architecture and illustrate how it solved Maritech's business needs
- We will then provide you with the details required to design a similar system to meet your business needs

EWM Architecture



EWM Components

1. EWM Tables

Consolidated tables to handle custom requirements

2. External Sources to EWM

Load into staging, validate, and insert into EWM

3. Oracle Apps to EWM

Extract from Oracle Apps and insert into EWM

4. Web Interface

Used to maintain and report employee information

5. EWM to Oracle Apps

Extract changes from EWM and load into Oracle Apps

Requirements

1. Load a batch of employees with all their historical information into Oracle Apps
 - a. Data load
 - b. Add a company or merger
 - c. Copy to a new installation
2. Perform batch updates of employees
3. Provide employee maintenance outside of Oracle Apps
 - a. To simplify employee maintenance
 - b. To ensure security during updates
 - c. To protect from data track errors

Using EWM for Employee Updates

1. At the start of a payroll cycle, EWM tables are refreshed with last period's payroll and HR data
2. Employee Web Interface is used to update data on the web and audit reports are used to validate them
3. Once changes are validated, a process is used to update Oracle Apps with all employee changes
4. An administrator is allowed to make any last minute changes directly in Oracle Apps
5. After payroll is completed, the cycle for next payroll period is started

Using EWM for New Releases

- Using a similar procedure, employee data can be copied to a new installation for testing or any other purpose
- After the extracting from Oracle Apps, EWM tables can be exported and moved to the new database
- Once there, EWM to Oracle Apps process can be used to load data into the new installation

Using EWM for Data Load

- Loading data from external systems also fits nicely into this architecture
 - Can be performed one time or periodically
- The External Sources to EWM process is used to load data into EWM tables
- Then steps 2-5 can be repeated
- Validation rules required for employee maintenance also insure data integrity during data load

Maritech's Business Gains

- EWM has fit extremely well into Maritech's business model by bringing it closer to its customers
 - Customers received a powerful web-based tool
 - Maritech protected its production system
- Interface is user-friendly
- Data changes are much easier
 - View all critical employee information on one page
 - Edits and deletes are simple
 - Adding a new employee is 1 step versus 10
- Date tracking problems are eliminated
- Handles multiple concurrent payrolls
- Audit reports provide a convenient way for managers to validate data changes for each payroll

1. EWM Tables

- EWM tables are based on the Oracle Apps tables
 - Much more streamlined because they focus strictly on our application needs
 - EWM does not require the flexibility of an off-the-shelf product
- EWM tables are divided into three major subject areas
 - Reference tables
 - Employee tables
 - Payroll tables

1.1 Reference Tables

- Contain all the reference information required for employee maintenance

EWM Tables	Description
Business groups, payrolls, etc	Contains company and payroll reference information required to validate employee information
Counties, cities, states, zips	Contains the address info for employee address and tax validation
Deductions and levies	Contains all the deductions and levies configured in Oracle Apps

1.2 Employee Tables

- Contain all the employee information

EWM Tables	Description
Persons and address tables	Contains employee personal and employment information
Federal, state, county and city tax rules	Contains all the levels of tax rules, may have multiple records for work and resident states
Deductions and levies	All employee deductions and levies in a single denormalized table
Direct Deposits	Bank account info for direct deposits in a single table

1.3 Payroll Tables

- Contain payroll history
 - Not essential but provide valuable employee data

EWM Tables	Description
Payroll summary	Contains all the payroll details such as earnings, deductions, bonuses, and hours in a few tables
Payment summary	Contains check and direct deposit details such as amount and account numbers

2. External Sources to EWM

- Loads data from an external source
 - Most commonly used for a first time data load
 - Simplest component because it does not interface with Oracle Apps
- Each new source may require its own staging tables
 - Changes are small because the target is the same
- Data is loaded into staging tables using SQL*Loader
- A validation process is used to report any problems
- Valid data is moved from staging tables into EWM tables
- To avoid hard coding, consider creating a table to store default values for business rules

3. Oracle Apps to EWM

- Copying data from Oracle Apps to EWM requires an intimate understanding of Oracle Apps tables
- The simplest design is to create one process per subject area
 - Reference tables
 - Employee tables
 - Payroll tables

3.1 Copying Reference Tables

- This is the simplest of the three processes
- Most tables require a simple query to retrieve a subset of rows and columns

EWM Tables	Mapping
Business groups, payrolls, etc	hr_organization_units, hr_locations, pay_payrolls, fnd_common_lookups
Counties, cities, states, zips	pay_us_states, pay_us_counties, pay_us_city_names, & pay_us_zip_codes
Deductions and levies	pay_element_types_f, pay_element_links_f & pay_element_values

3.1 Complexity

- Tax jurisdiction is made up of 3 portions: states, counties, and cities
 - Use the primary flag to pick a unique city name per jurisdiction because a city can have multiple records per jurisdiction
- Oracle has zip_start and zip_end to represent continuous zip ranges
 - Convert to one row per zip to enhance pick lists
- Deductions and attribute definitions are table driven
 - Default value, mandatory flag, display order, etc are required for validation on the web
 - Exclude attributes with mandatory_flag = 'X' because they are managed by Oracle

3.2 Copying Employee Tables

- This process copies all the employee specific data

EWM Tables	Mapping
Persons and address tables	per_people_f, pay_people_groups, per_assignments_f & per_addresses
Federal, state, county and city tax rules	pay_us_emp_fed_tax_rules_f, state_tax_rules_f, county_tax_rules_f, & city_tax_rules_f
Deductions and levies	pay_element_entries_f & pay_element_entry_values_f
Direct Deposits	pay_external_accounts, pay_org_payment_methods_f & pay_personal_payment_methods_f

3.2 Complexity

- Merging multiple independently date tracked tables such as `per_people_f` and `per_assignments_f` into one consolidated table using a brute force algorithm is inefficient
 - Use a single query with complex joins on dates
- Be careful when mapping filling statuses
 - They vary by state
- Deductions may cause a performance problem because `pay_element_entries_f` and `pay_element_entry_values_f` maybe very large
 - In Maritech's case, they are currently 7.5M and 22M respectively
 - Add hints to utilize the best indexes

3.3 Copying Payroll Tables

- This is the most complex process because it requires an understanding of Oracle's payroll process

EWM Tables	Mapping
Payroll summary	pay_payroll_actions, pay_assignment_actions, pay_run_results, pay_run_result_values, pay_element_classifications, pay_element_types_f & pay_input_values_f
Payment Summary	pay_payroll_actions, pay_assignment_actions, pay_pre_payments, pay_org_payment_methods_f, & pay_personal_payment_methods_f

3.3 Complexity

- Performance is a major issue
 - In Maritech's example, the two largest tables are pay_run_results and pay_run_result_values
 - Currently 130M and 550M records respectively
 - Can be extracted efficiently for each payroll run because it is indexed appropriately
- Extract payroll data into two denormalized tables called payroll_summary and payment_summary
 - Currently 25M and 3.5M records respectively
 - Reporting is efficient because it is based on these two tables

3.3 Populating Payroll Summary

```
insert into payroll_summary
select ....
from pay_element_classifications c
, pay_element_types_f et
, pay_input_values_f iv
, pay_run_result_values rrv
, pay_run_results rr
, pay_assignment_actions aa
, pma_actions_summary s
-- get all R actions for this payment action
where s.payment_action_id = in_payment_action_id
-- get all assignment actions for R actions
and aa.payroll_action_id = s.payroll_action_id
and rr.assignment_action_id = aa.assignment_action_id
-- get run results and values
and rr.assignment_action_id = aa.assignment_action_id
and rrv.run_result_id = rr.run_result_id
```

3.3 Populating Payroll Summary (cont)

```
-- value should not be 0 or null
and nvl(rrv.result_value,'0') <> '0'
and iv.input_value_id = rrv.input_value_id
and id_end_date between iv.effective_start_date and iv.effective_end_date
-- get element name and classification
and et.element_type_id = iv.element_type_id
and id_end_date between et.effective_start_date and et.effective_end_date
and c.classification_id = et.classification_id
-- 3 types of elements:
-- 1. Normal - Use Pay Value rather than Amount
-- 2. Fees - Withheld Fee Amount
-- 3. Information - PMA values are Amount, Oracle are Pay Value
and ((iv.name = 'Pay Value' and c.classification_name <> 'Information')
or iv.name = 'Withheld Fee Amount'
or (iv.name in ('Amount', 'Pay Value')
and c.classification_name = 'Information'));
```

4. Web Interface

- Web interface is designed to simplify employee maintenance

4.1 Find Employee

http://10.10.98.40/pls/mtwbtest/pma_gw.parameters?pi_payroll_no=&pi_ssn=&pi_lastname=&pi_start_ - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss Messenger

Check Employee Reference Reports

View/Edit Add Employee Audit Address Audit Tax Audit Deduction Audit Direct Deposit Audit

Start Week (default: latest payroll week) 8

Start Year 2002

Payroll Number

Social Security Number

Last Name (minimum 2 letters, case sensitive) Smith

Submit

Payroll Number or Social Security Number or Last Name is required.

Done Internet

Allows users to enter search criteria

4.2 View Employee Info

View Employee - Microsoft Internet Explorer

Parameters Latest Check

View Employee
 Employee: Doe Joe M - 11111 Next Payroll Start: 18-FEB-2002

Employee Info

SSN*	555-66-7777	Registration Category*	1 - Longshore
Assigned Area*	H - HAWAII	Registration Class*	N - Not Applicable
Assigned Local*	ILWU 142	Experience Level*	0
Assigned Port*	HO1 - Oahu	Check Distribution*	OAHU - Oahu
Active Code*	AA - Active	Payroll Name*	Weekly Payroll

W4 Address Alternate Address

1 Fun Way Atascadero, CA 93423	2 Another Fun Way Fort Derussy, HI 96826
-----------------------------------	---

Tax Rules

Jurisdiction	Filing Status	Allow	Addnl Tax Exemptions
Federal	Single	1	0.00 FIT
CA	Single/Married w/Two Incomes	1	0.00
HI	Single	2	0.00 SDI

Deductions

Name	Value
Dues Loc 142	2.000
Parking	77.00
Unit Fund Oahu LS	10.00

Direct Deposits

Priority	Account Type	Account Number	Amount	Percent
2	Checking Account	123456789		80
3	Checking Account	222333444		20

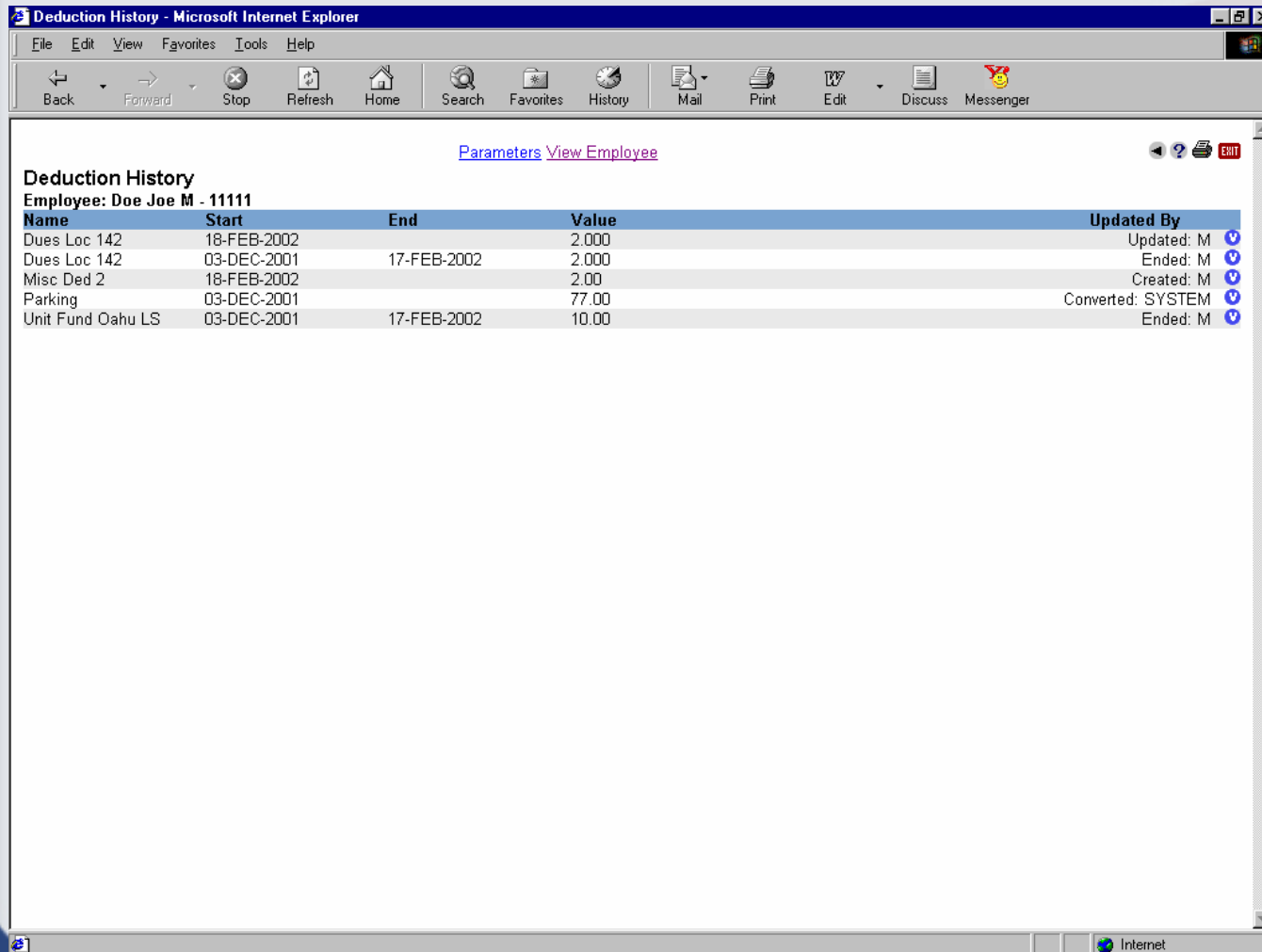
Actions: View History View Add Edit Delete

Shows current employee information

4.2 View Employee Info (cont)

- Allows users to answer most business questions from a single source
- Used as a launch pad for all view, edit, and insert operations
 - Add/edit/delete icons are not displayed for users who do not have update privileges
- Used to delete records when delete operation is permitted

4.3 History Info



[Parameters](#) [View Employee](#)

Deduction History
Employee: Doe Joe M - 11111

Name	Start	End	Value	Updated By
Dues Loc 142	18-FEB-2002		2.000	Updated: M
Dues Loc 142	03-DEC-2001	17-FEB-2002	2.000	Ended: M
Misc Ded 2	18-FEB-2002		2.00	Created: M
Parking	03-DEC-2001		77.00	Converted: SYSTEM
Unit Fund Oahu LS	03-DEC-2001	17-FEB-2002	10.00	Ended: M

A page for each section of employee data

4.3 History Info (cont)

- Each history page provides all the detailed information required to answer complex questions
- History pages are formatted as lists, showing each change, who made it and when it were made
- For each record in the history list, the user can drill down to see record details
- There are 6 history pages:
 - Personal Info History
 - Address History
 - Tax Rules History
 - Deductions History
 - Levies History
 - Direct Deposits History

4.4 View/Add/Edit

The screenshot shows a Microsoft Internet Explorer browser window with the title 'Edit Direct Deposit - Microsoft Internet Explorer'. The address bar is empty. The browser's menu bar includes File, Edit, View, Favorites, Tools, and Help. The toolbar contains icons for Back, Forward, Stop, Refresh, Home, Search, Favorites, History, Mail, Print, Edit, Discuss, and Messenger. The main content area displays the 'Edit Direct Deposit' form. At the top right of the form, there are links for 'Parameters', 'View Employee', and 'Direct Deposit History'. The form fields are as follows:

Edit Direct Deposit	
Employee: Doe Joe M - 11111	
Priority: 2	
Direct Deposit	
Priority*	2
Account Type*	C - Checking Account
Account Number*	123456789
Account Name*	High Savings
Bank Name*	Bank of America
Bank Branch*	San Francisco
Transit Code*	111222333
Amount*	
Percent*	80
Issue Prenote	<input type="checkbox"/>
<input type="button" value="Save"/>	

The status bar at the bottom shows 'Done' and 'Internet'.

A page for each section of employee data

4.4 View/Add/Edit (cont)

- View mode simply displays the information
- Insert mode displays the context information at the top of the page and blank fields for data entry
- Edit mode displays the current information and allows updateable fields to be changed
- Date tracking is simplified because all changes are effective on the start date of the next payroll run

4.5 Add Employee

Add Employee - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss Messenger

[Parameters](#)

Add Employee

Employee Info

Payroll Number*	<input type="text"/>	Active Code*	AA - Active
SSN*	<input type="text"/>	Registration Category*	1 - Longshore
Last Name*	<input type="text"/>	Registration Class*	A - Category A
First Name*	<input type="text"/>	Experience Level*	0
Middle Name	<input type="text"/>	Filing Status*	Single
Suffix	<input type="text"/>	Allowances*	<input type="text"/>
Assigned Area*	H - HAWAII	Check Distribution*	KAUAI - Kauai
Assigned Local*	ILWU 142	Levy Check Distribution*	LEVY - Levy Distribution (Req)
Assigned Port*	HH1 - Hawaii	Address On Check	<input checked="" type="checkbox"/>
Check Message	<input type="text"/>		

W4 Address

Address 1*	<input type="text"/>
Address 2	<input type="text"/>
Address 3	<input type="text"/>
City*	<input type="text"/>
State*	<input type="text"/>
Zip*	<input type="text"/>
County*	<input type="text"/>

Alternate Address

Address 1*	<input type="text"/>
Address 2	<input type="text"/>
Address 3	<input type="text"/>
City*	<input type="text"/>
State*	<input type="text"/>
Zip*	<input type="text"/>
County*	<input type="text"/>

City, State, Zip, and County: use Search icon to auto-populate or enter each field manually

Done Internet

Greatly simplifies data entry with a single page for adding an employee

4.5 Add Employee (cont)

- Replaces up to 10 steps with Oracle Apps screens
- Requires the user to specify tax information
 - Used to generate tax rules based on employee's W4 address and company's address

4.6 Reports

Check - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss Messenger

[Parameters](#) [View Employee](#) [Check List](#) [Previous Check](#) [Next Check](#)

Check

Reg No	Port	SSN	Last Name	First Name	MI	PP#	Issue Date	Fed Status	State Status	L/S Exp	CD Hours	Check Number	Dist Code
11111	HO1	555-66-7777	Doe	Joe	M	3	17-JAN-02	S-0	S-0	0		3014	OAHU

Company No	SFT	Port	Wkld	Date	Occ	Gross Inc	Cargo Pen	Cargo Pen	Allow Non-Txbl	Allow Txbl	Mileage	ST Hours	OT Hours	POT Hours	PPOT Hours	ST Rate
8003-0	2	HO1	1220	ST		81.36							2.00			27.12
8003-0	1	HO1	0108	ST		135.60						5.00				27.12
8003-0	1	HO1	0109	ST		325.44						6.00	4.00			27.12
8003-0	1	HO1	0110	ST		325.44						6.00	4.00			27.12
8003-0	1	HM1	0111	ST		135.60						5.00				27.12
8003-0	2	HO1	0112	ST		203.40							5.00			27.12
8003-0	1	HO1	0113	ST		183.06							4.50			27.12
8003-0	1	HO1	0113	ST		20.34							.50			27.12
Total						1,410.24						22.00	20.00			

Description	State	Current	YTD	Description	State	Current	YTD
Earnings		1,410.24	5,224.00	Regular Hours		42.00	143.50
FIT		-303.94	-1,209.79	Holiday	HI		732.24
Medicare EE		-20.45	-75.75	Wages Regular	HI	1,410.24	4,491.76
SIT	HI	-101.64	-380.41	Gross Wages Fd		1,410.24	5,224.00
SS EE		-87.44	-323.89	Check Amount		868.57	
Dues Loc 142		-28.20	-104.47				
Parking			-77.00				
Unit Fund Oahu LS			-10.00				
Net Pay		868.57	3,042.69				

To the order of **Message**

Doe, Joe M
 1 Fun Way
 HONOLULU HI 55555

Done Internet

Check stub is the most critical report for employees

4.6 Reports

- HR and Payroll reports are included to provide additional employee information
- For example, check stub contains all the year to date payroll information
- Links at the top of each page allows users to jump between various reports and employee maintenance pages

5. EWM to Oracle Apps

- Oracle does not support direct updates to tables
 - However, APIs are not well documented and in some cases APIs don't even exist
 - Thus tables may have to be updated directly
 - In either case, thorough testing is essential
- In general, there is one API package per Oracle Apps table, each with procedures whose names begin with create, update or delete
- For date tracked tables, there are two modes
 - Update mode adds a record with an effective date
 - Correction mode updates an existing record

5.1 Add a New Employee

Steps	API/Insert/Update
1. Insert person	hr_employee_api. create_employee
2. Update people group (was created by the person API)	hr_assignment_api. update_emp_asg_criteria
3. Update assignment (was created by the person API)	hr_assignment_api. update_us_emp_asg
4. Insert base salary	insert into per_pay_proposals
5. Insert check as the payment method	hr_entry_api. insert_element_entry

5.2 Update Employee Information

Steps	API/Insert/Update
1. Update personal information if it changed, if a record exists on that date, set mode to correct, else to update	per_per_upd.upd
2. Update assignment and people group information if it exists, set mode to correct or update	hr_assignment_api. update_emp_asg_criteria

5.3 Insert or Update Addresses

Steps	API/Insert/Update
1. Insert new addresses	hr_person_address_api. create_person_address
2. Update existing address records	hr_person_address_api. update_person_address

5.4 Insert or Update Tax Rules

Steps	API/Insert/Update
1. Update federal tax rules (inserted by earlier API)	pay_federal_tax_rule_api. update_fed_tax_rule
2. Insert state tax rules if they have not been inserted by earlier API, otherwise update	pay_state_tax_rule_api. create_state_tax_rule pay_state_tax_rule_api. update_state_tax_rule
3. Insert county tax rules if they have not been inserted by earlier API, otherwise update	pay_county_tax_rule_api. create_county_tax_rule pay_county_tax_rule_api. update_county_tax_rule
4. Insert city tax rules if they have not been inserted by earlier API, otherwise update	pay_city_tax_rule_api. create_city_tax_rule pay_city_tax_rule_api. update_city_tax_rule

5.5 Insert or Update Deductions

Steps	API/Insert/Update
1. If deduction is ended, use the delete API to set end date	hr_entry_api. delete_element_entry
2. Update deduction if exists, else insert it (hot defaults should not be updated because they are set at company level)	hr_entry_api. insert_element_entry

5.6 Insert or Update Direct Deposits

Steps	API/Insert/Update
1. If direct deposit is ended, use the delete API to set end date	hr_personal_pay_method_api. delete_personal_pay_method
2. Insert bank account if it does not exist	insert into pay_external_accounts
3. Update direct deposit if exists, else insert it	hr_personal_pay_method_api. create_personal_pay_method

Summary

- We hope that many of you will find EWM useful
 - You may also consider a subset of the system

Sub-system	Components (EWM tables assumed)
Data loading	External Sources & EWM to Oracle Apps
Self-service reporting	Oracle Apps to EWM & Web Interface (view only)
Employee maintenance	Oracle Apps to EWM (no reporting tables), Web Interface & EWM to Oracle Apps

- We hope that this walk-thru provided you with the ideas you need to solve your immediate business needs or to simply enhance your existing solutions