Part 3 - Examples

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Part 3 Examples

Introduction   Part 1 provides the function point analysis process for sizing software following the IFPUG Method as well as the detailed rules for identifying and counting data functions and transactional functions.

Part 2 provides detailed counting practices and enhanced examples to assist the practitioner in applying function point rules to various types of data, in grouping data into logical files and record element types, in distinguishing data functions (internal logical files, external interface files) from transactional functions (external inputs, external outputs, external inquiries), and in determining whether an activity is considered to be part of an enhancement project or as a maintenance activity.

Part 3 provides examples of data functions and transactional functions to illustrate the counting rules from Part 1. The examples provide:

- A description of the data or transactional function

- The basis for the count

- The tables to be used in applying the counting rules

- The identification of the functional complexity

- Their contribution to the unadjusted function point count

Contents   Part 3 includes the following sections:

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Data Function Counting Examples

Introduction   This section uses a Human Resources (HR) application along with a Security application and a Mail Distribution application to illustrate procedures to identify and count data functions. In addition to this section, examples are in the Case Studies which are included in the IFPUG corresponding documentation.

Caution: The examples in this section and throughout the manual have two purposes:

1. To illustrate how the function point counting rules are applied for a given set of user requirements

2. To allow you to practice using the counting procedures

Each counter must:

*   Analyze the specific user requirements that apply for each project or application being counted, and

*   Count based on those requirements.

Contents   This section explains the organization of the examples and includes detailed examples for counting ILFs and EIFs.

Organization of the Counting Examples

This section explains how the examples are presented.
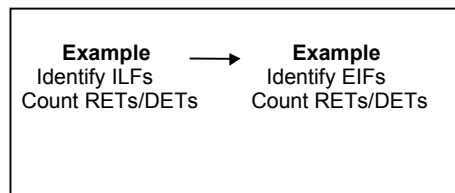
Outline of the Organization

The following list outlines the sequence of information in the detailed examples.

For each example:

1. The ILFs or EIFs are identified.

2. The RETs and DETs that contribute to the functional complexity are identified and counted.

Diagram of the Organization

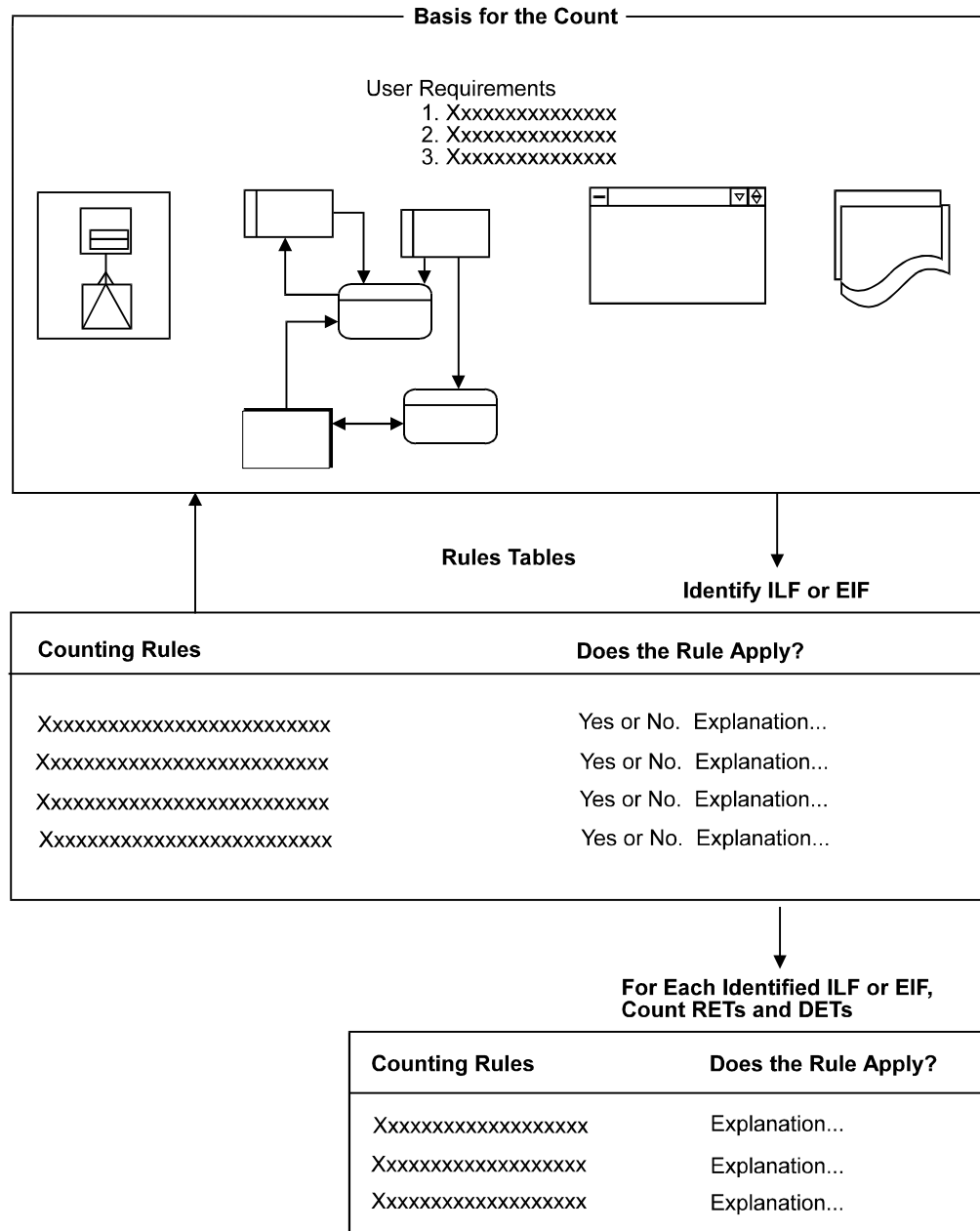The following diagram illustrates the organization of the examples.

Count for Each Example

Each example includes the following components:

1. Basis for the count

2. Tables applying the counting rules

Diagram of   The following diagram illustrates the components for each example and the
Components   flow of information.

Basis for the Count

User Requirements
1. Xxxxxxxxxxxxxx
2. Xxxxxxxxxxxxxx
3. Xxxxxxxxxxxxxx

Rules Tables

Identify ILF or EIF

Counting Rules	Does the Rule Apply?
Xxxxxxxxxxxxxxxxxxxxxxxxxxx	Yes or No. Explanation...
Xxxxxxxxxxxxxxxxxxxxxxxxxxx	Yes or No. Explanation...
Xxxxxxxxxxxxxxxxxxxxxxxxxxx	Yes or No. Explanation...
Xxxxxxxxxxxxxxxxxxxxxxxxxxx	Yes or No. Explanation...

**For Each Identified ILF or EIF,
Count RETs and DETs**

Counting Rules	Does the Rule Apply?
Xxxxxxxxxxxxxxxxxxx	Explanation...
Xxxxxxxxxxxxxxxxxxx	Explanation...
Xxxxxxxxxxxxxxxxxxx	Explanation...

Basis for the Count

The basis for the count begins each example. As shown in the diagram of components, the count may be based on the following components:

- User requirements

- Data and process models

- Windows, screens, or reports

Note: All components in the diagram are not included in all examples. In some examples, the requirements stand alone as the basis for the count. Other examples include a data or process model, windows, screens, and reports.

Rules Table

The analysis to identify functions is presented in a table that lists the counting rules for the function type. The rules are applied to the components that make up the basis for the count. The analysis is explained in the table in the column "Does the Rule Apply?".

Note: If all the rules apply, the example is counted as an ILF or EIF.

The next table shows the rules and explanation for the complexity for each function type identified.

ILF Counting Examples

Introduction   This section uses a Human Resources (HR) application to illustrate procedures to identify and count data functions. In addition to this section, further examples are in the Case Studies which are included in the corresponding IFPUG documentation.

Contents   This section includes the following examples:

Summary Descriptions of ILF Counting Examples

The examples for ILFs are described in the following table.

| Example	Summary Description	Page
Audit Data	This example looks at the implementation to count ILFs.	1-9
Report Definition	This example shows how to count user defined report definitions maintained within an application.	1-12
Alternate Index	This example moves beyond the user requirements described for the report definition example to focus on requirements for physical implementation.	1-15
Shared Application Data	This example shows how to count data that is maintained by more than one application.	1-16
Different Users/Different Data Views	This example shows that two applications can count the same file with different DETs.	1-22

Example: <mark>Audit Data for Inquiries and Reports</mark>

User Requirements   Analysis of the following user security requirements showed a need for audit data:

1. Allow or deny user access to each screen in the application.

2. Change a user's access to each screen.

3. Report on any screen security added or changed using the following data:

   – Identification of the user who is adding or changing security information

   – The user and screen security that was added or changed

   – The user and screen security before and after a change was made

   – Date and time the add or change occurred.

4. Capture audit data to monitor and report daily security activity. This requirement was determined when a design was implemented to satisfy the user's screen security requirements.

Data Flow
Diagram

Legend:

User or Application

Data Stored

Process

Flow of Data
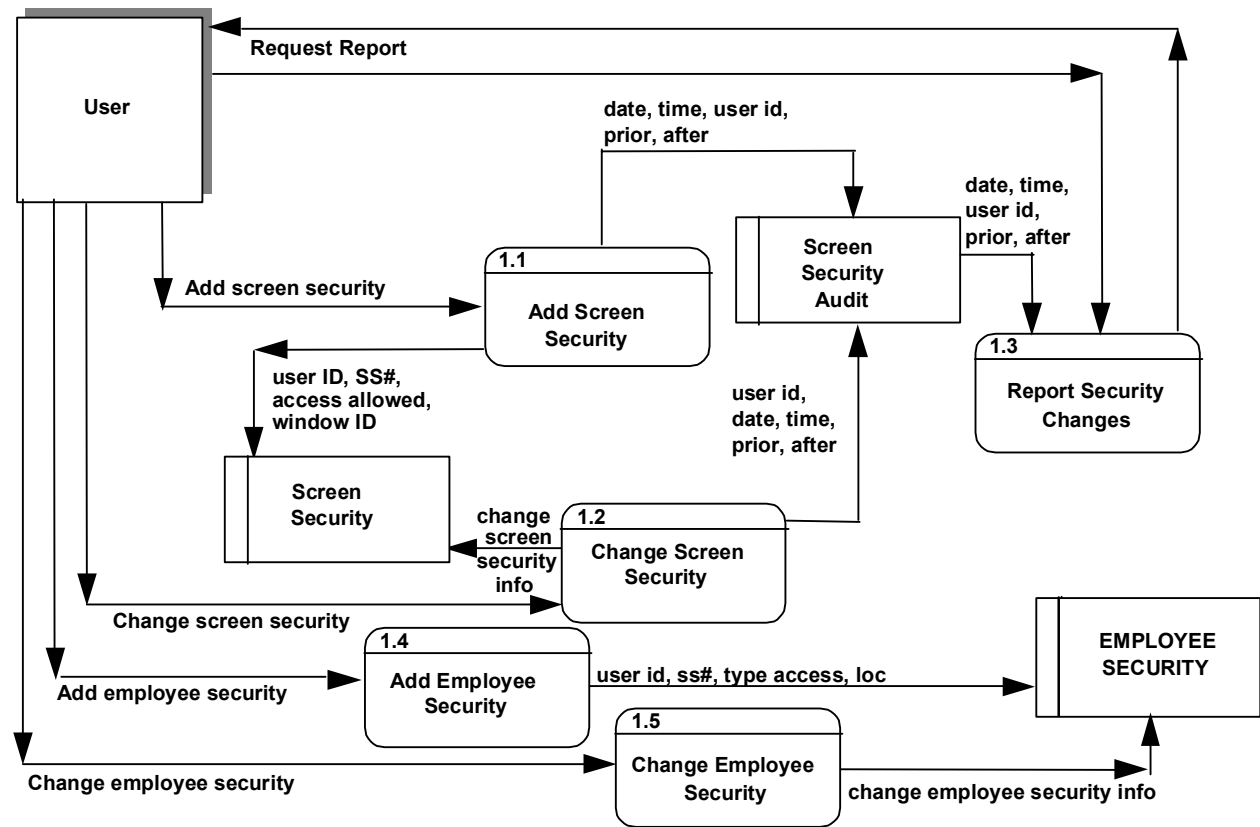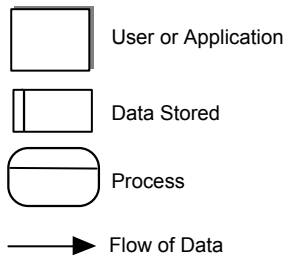
Identify ILFs   Use the ILF rules to determine whether screen security audit data is an ILF.

The following table shows the analysis for screen security audit data.

ILF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	No. Screen security audit data must include the screen security entity or table to represent the user requirement to add security information.
The group of data is maintained through an elementary process within the application boundary being counted.	Yes. When security access for windows is added or changed, the audit information is maintained.

The group of audit data for screen security is not counted as an ILF on its own because it is part of screen security.

Example: Report Definition

User Requirements

The user requires the ability to perform the following activities:

1. Enter a report definition which includes

    – A unique report identifier
    – A report name
    – Fields used on the report
    – Calculations to generate the report.

2. Reuse the defined report at any time, changing the definition if necessary.

3. View and print a report using the report definition.

4. Inquire on existing report definitions by report name or report identifier.

Identify ILFs

From the user requirements, report identifier, report name, fields on the report, and calculations together make up one logical grouping of data for a report definition because they are maintained as a group.

The following table shows the analysis to determine whether the report definition information is an ILF. See the Case Studies for how the remaining requirements may be counted.

ILF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	Yes. The data is used to view and report information in the HR application.
The group of data is maintained through an elementary process within the application boundary being counted.	Yes. The processes are that of adding and changing the definition.

Based on the analysis, the report definition information is an ILF.

Count RETs and DETs   Count the number of data element types (DETs) and record element types (RETs).

For DETs, look at each field associated with the report definition ILF and determine whether the DET counting rules apply.

The report definition ILF includes:

- Report name
- Report identifier
- Fields
- Calculations

The analysis of the DETs for the report definition ILF is shown below:

ILF DET Counting Rules	Does the Rule Apply?
Count a DET for each unique user recognizable, non-repeated field maintained in or retrieved from the ILF or EIF through the execution of an elementary process.	All fields are user recognizable. Fields and Calculations are DETs which have multiple occurrences.
When two applications maintain and/or reference the same ILF/EIF, but each maintains/references separate DETs, count only the DETs being used by each application to size the ILF/EIF.	There is no data of this type.
Count a DET for each piece of data required by the user to establish a relationship with another ILF or EIF.	There is no data of this type.

For RETs, identify subgroups based on the RET counting rules.

RET Counting Rules	Does the Rule Apply?
Count a RET for each optional or mandatory subgroup of the ILF or EIF. *Or*	The report definition does not have subgroups.
If there are no subgroups, count the ILF or EIF as one RET.	Because, there are no subgroups, count the report definition ILF as one RET.

There are no subgroups; therefore, this ILF has one RET.

The RET and DET totals for report definition are shown in the following table.

RETs		DETs	
• Report definition group		• Report name • Report identifier • Fields • Calculations	
Total	1 RET	**Total**	4 DETs

Example: Alternate Index

User Requirements

The user needs to inquire on report definitions using the report name as the key to finding the desired definition. To satisfy the user requirement, an alternate index is created using the report name as the key.

Identify ILFs

The following table shows the summary analysis to determine whether the alternate index is an ILF.

ILF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	No. From the user perspective, this filter function provides the user with specific attributes of the report definitions created that reference the report definition ILF. This technical filter, necessary to create the inquiry list, does not constitute a business function on its own.
The group of data is maintained through an elementary process within the application boundary being counted.	Not applicable.

Based on the analysis in the table, the alternate index is not a logical group, therefore, it is not counted as an ILF.

Example: Shared Application Data

**User
Requirements**

The HR user requires the ability to maintain information on each new employee.

The information that must be maintained by the HR user includes:

- Employee ID
- Employee Name
- Employee Mailing Address
- Employee Pay Grade
- Employee Job Title

As a result of creating a new employee record, the employee's anticipated Pension Eligibility Date should be automatically calculated and saved with the other employee information.

The Security user requires that a security level be assigned to each new employee. The Security department conducts a background search after each employee is hired and assigns the appropriated security level.

The information that must be maintained by the Security user includes:
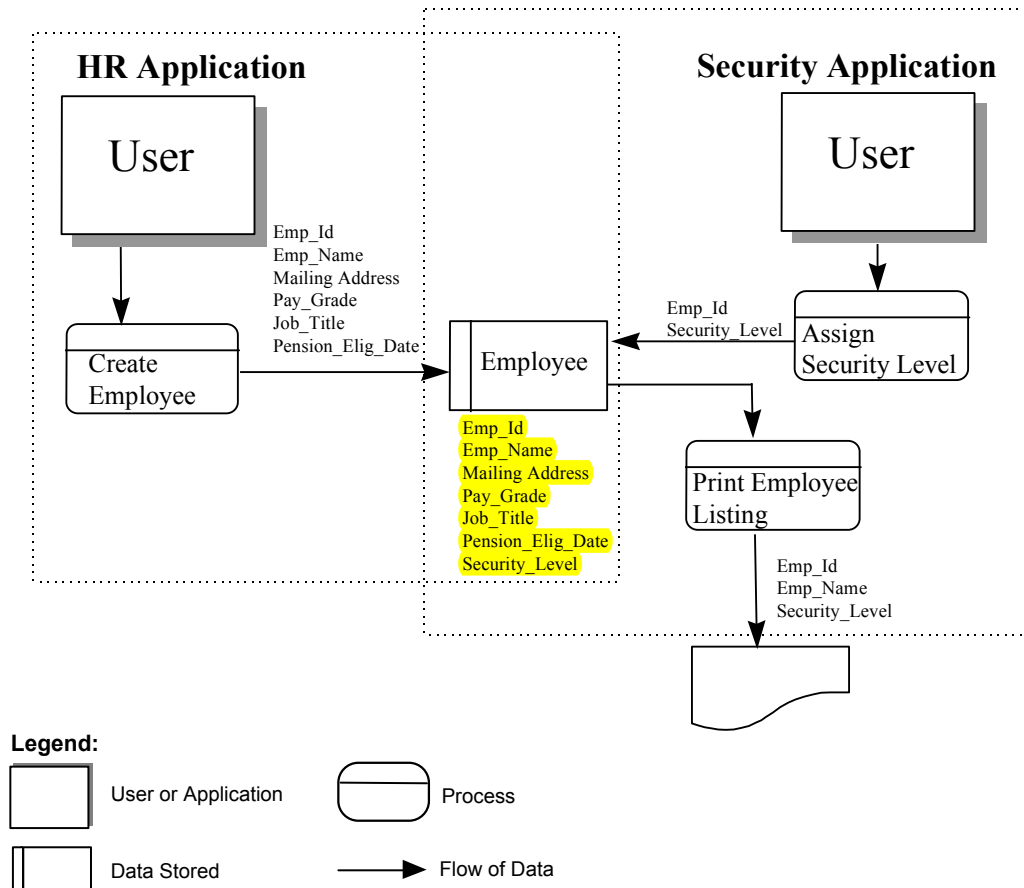
- Employee ID
- Employee Security Level

The Security user also requires a report listing the following information:

- Count of Employee IDs

- Employee Name

- Employee Security Level

Data Flow Diagram

The following diagram shows the data flow for this example.

Identify ILFs   Determine whether the employee information is an ILF for the HR application.

The following table shows the summary analysis.

ILF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	Yes. This information is recognized and required by the HR users.
The group of data is maintained through an elementary process within the application boundary being counted.	Yes. The process of creating an employee record is within the boundary of the HR application.

The analysis shows that the employee information is an ILF for the HR application.

Determine whether the employee information is an ILF for the Security application.

The following table shows the summary analysis.

ILF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	Yes. This information is recognized and required by the Security users.
The group of data is maintained through an elementary process within the application boundary being counted.	Yes. The process of assigning the employee security level is within the boundary of the Security application.

The analysis shows that the employee information is an ILF for the Security application.

Count RETs and DETs (HR Application)

Count the number of data element types (DETs) and record element types (RETs) for the employee ILF in the HR application.

For DETs, look at each field associated with the employee ILF in the HR application and determine whether the DET counting rules apply.

The following list includes the fields for the employee information:

* Employee ID
* Employee Name
* Employee Mailing Address
* Employee Pay Grade
* Employee Job Title
* Pension Eligibility Date
* Employee Security Level

The analysis of the DETs for the employee ILF in the HR application is shown below:

ILF DET Counting Rules	Does the Rule Apply?
Count a DET for each unique user recognizable, non-repeated field maintained in or retrieved from the ILF or EIF through the execution of an elementary process.	The following fields are recognized by the HR user: • Employee ID • Employee Name • Employee Mailing Address • Employee Pay Grade • Employee Job Title • Pension Eligibility Date
When two applications maintain and/or reference the same ILF/EIF, but each maintains/references separate DETs, count only the DETs being used by each application to size the ILF/EIF.	There is data of this type. All of the fields are used within the HR application *except* the Employee Security Level.
Count a DET for each piece of data required by the user to establish a relationship with another ILF or EIF.	There is no data of this type.

For RETs, identify subgroups based on the RET counting rules.

RET Counting Rules	Does the Rule Apply?
Count a RET for each optional or mandatory subgroup of the ILF or EIF. *Or*	The employee information does not have subgroups.
If there are no subgroups, count the ILF or EIF as one RET.	Because there are no subgroups, count the employee ILF in the HR application as one RET.

There are no subgroups, therefore count one RET for the employee ILF in the HR application.

The RET and DET totals for the employee ILF in the HR application are shown in the following table.

RETs		DETs	
• Employee information group		• Employee ID • Employee Name • Employee Mailing Address • Employee Pay Grade • Employee Job Title • Anticipated Pension Eligibility Date	
Total	1 RET	**Total**	6 DETs

Count RETs and DETs (Security Application)

Count the number of data element types (DETs) and record element types (RETs) for the employee ILF in the Security application.

For DETs, look at each field associated with the employee ILF in the Security application and determine whether the DET counting rules apply.

The employee ILF includes:

- Employee ID
- Employee Name
- Employee Mailing Address
- Employee Pay Grade
- Employee Job Title
- Anticipated Pension Eligibility Date
- Employee Security Level

The Analysis of the DETs for the employee ILF in the security application is shown below:

ILF DET Counting Rules	Does the Rule Apply?
Count a DET for each unique user recognizable, non-repeated field maintained in or retrieved from the ILF or EIF through the execution of an elementary process.	The following fields are recognized by the Security user: - Employee ID - Employee Name - Employee Security Level
When two applications maintain and/or reference the same ILF/EIF, but each maintains/references separate DETs, count only the DETs being used by each application to size the ILF/EIF.	There is data of this type. Only the Employee ID, Employee Name and Employee Security Level are used by the Security application.
Count a DET for each piece of data required by the user to establish a relationship with another ILF or EIF.	There is no data of this type.

For RETs, identify subgroups based on the RET counting rules.

RET Counting Rules	Does the Rule Apply?
Count a RET for each optional or mandatory subgroup of the ILF or EIF. *Or*	The employee information does not have subgroups.
If there are no subgroups, count the ILF or EIF as one RET.	Because there are no subgroups, count the employee ILF in the Security application as one RET.

There are no subgroups, therefore count one RET for the employee ILF in the Security application.

The RET and DET totals for the employee ILF in the Security application are shown in the following table.

RETs		DETs	
• Employee information group		• Employee ID • Employee Name • Employee Security Level	
Total	1 RET	**Total**	3 DETs

Example: Different Users/Different Data Views

**User
Requirements**

The information that must be maintained by the HR user includes:

- Employee ID
- Employee Name
- Employee Mailing Address

    The Employee Mailing Address includes the following components:
    - Floor
    - Building Code
    - Street
    - City
    - State
    - Zip Code

- Employee Pay Grade
- Employee Job Title

As a result of creating a new employee record, the employee's anticipated Pension Eligibility Date should be automatically calculated and saved with the other employee information. The HR user requires the ability to produce mailing labels for each employee.

The Mail Distribution user requires the ability to maintain the Building Codes for each employee to reflect changes in the recognized codes.
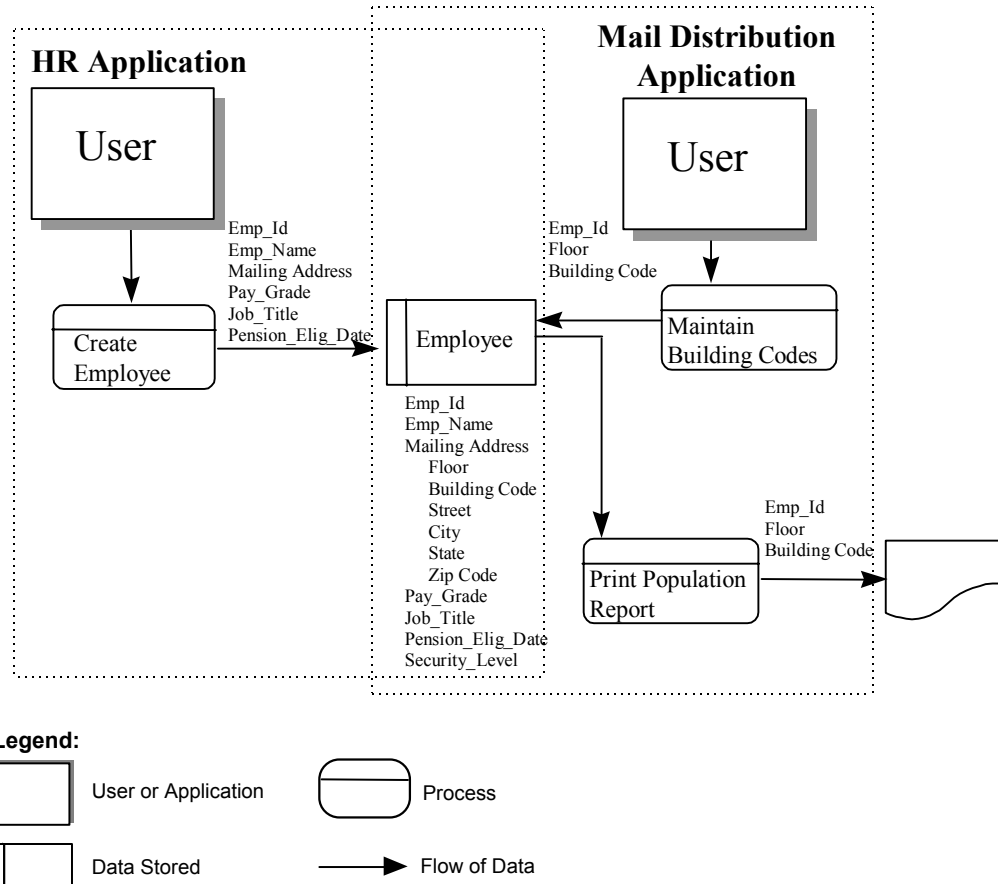
The Mail Distribution user also requires the ability to evaluate the population in each site to determine the most efficient process for delivering the internal mail. A report is produced listing the number of employees located on each floor for each building.

The information that must be maintained or referenced by the Mail Distribution user includes:

- Employee ID
- Floor
- Building Code

Data Flow Diagram   The following diagram shows the data flow for this example.

HR Application

User

Emp_Id
Emp_Name
Mailing Address
Pay_Grade
Job_Title
Pension_Elig_Date

Create Employee

Employee

Emp_Id
Emp_Name
Mailing Address
    Floor
    Building Code
    Street
    City
    State
    Zip Code
Pay_Grade
Job_Title
Pension_Elig_Date
Security_Level

Mail Distribution Application

User

Emp_Id
Floor
Building Code

Maintain Building Codes

Emp_Id
Floor
Building Code

Print Population Report

Legend:

[ ] User or Application   ( ) Process

[ ] Data Stored   → Flow of Data

Identify ILFs   Determine whether the employee information is an ILF for the HR application.

The following table shows the summary analysis.

ILF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	Yes. This information is recognized and required by the HR users.
The group of data is maintained through an elementary process within the application boundary being counted.	Yes. The process of creating an employee record is within the boundary of the HR application.

The analysis shows that the employee information is an ILF for the HR application.

Determine whether the employee information is an ILF for the Mail Distribution application. The following table shows the summary analysis.

ILF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	Yes. This information is recognized and required by the Mail Distribution users.
The group of data is maintained through an elementary process within the application boundary being counted.	Yes. The process of maintaining building codes is within the boundary of the Mail Distribution application.

The analysis shows that the employee information is an ILF for the Mail Distribution application.

Count RETs and DETs for HR Application

Count the number of data element types (DETs) and record element types (RETs) for the employee ILF in the HR application.

For DETs, look at each field associated with the employee ILF in the HR application and determine whether the DET counting rules apply.

Employee information includes:

- Employee ID
- Employee Name
- Employee Mailing Address
  - Floor
  - Building Code
  - Street
  - City
  - State
  - Zip Code
- Employee Pay Grade
- Employee Job Title
- Pension Eligibility Date
- Employee Security Level

The analysis of the DETs for the employee ILF is shown below:

ILF DET Counting Rules	Does the Rule Apply?
Count a DET for each unique user recognizable, non-repeated field maintained in or retrieved from the ILF or EIF through the execution of an elementary process.	The following fields are recognized by the HR user: • Employee ID • Employee Name • Employee Mailing Address • Employee Pay Grade • Employee Job Title • Pension Eligibility Date
When two applications maintain and/or reference the same ILF/EIF, but each maintains/references separate DETs, count only the DETs being used by each application to size the ILF/EIF.	There is data of this type. Only the Employee ID, Employee Name, Employee Mailing Address, Employee Pay Grade, Employee Job Title, and Pension Eligibility Date are used by the HR application.
Count a DET for each piece of data required by the user to establish a relationship with another ILF or EIF.	There is no data of this type.

For RETs, identify subgroups based on the RET counting rules.

RET Counting Rules	Does the Rule Apply?
Count a RET for each optional or mandatory subgroup of the ILF or EIF. *Or*	The employee information does not have subgroups.
If there are no subgroups, count the ILF or EIF as one RET.	Because, there are no subgroups, count the employee ILF in the HR application as one RET.

There are no subgroups, therefore count one RET for the employee ILF in the HR application.

The RET and DET totals for the employee ILF in the HR application are shown in the following table.

RETs	DETs
• Employee information group	• Employee ID • Employee Name • Employee Mailing Address • Employee Pay Grade • Employee Job Title • Pension Eligibility Date
Total 1 RET	**Total** 6 DETs

For RETs, identify subgroups based on the RET counting rules.

RET Counting Rules	Does the Rule Apply?
Count a RET for each optional or mandatory subgroup of the ILF or EIF. *Or*	The employee information does not have subgroups.
If there are no subgroups, count the ILF or EIF as one RET.	Because, there are no subgroups, count the employee ILF in the Mail Distribution application as one RET.

There are no subgroups; therefore, count one RET for the employee ILF in the Mail Distribution application.

Count RETs and DETS for Mail Distribution Application

Count the number of data element types (DETs) and record element types (RETs) for the employee ILF in the Mail Distribution application.

For DETs, look at each field associated with the employee ILF in the Mail Distribution application and determine whether the DET counting rules apply.

Employee information Includes:

- Employee ID
- Employee Name
- Employee Mailing Address
    - Floor
    - Building Code
    - Street
    - City
    - State
    - Zip Code
- Employee Pay Grade
- Employee Job Title
- Anticipated Pension Eligibility Date
- Employee Security Level

The analysis of the DETs for the employee information in the Mail Distribution application is shown below:

ILF DET Counting Rules	Does the Rule Apply?
Count a DET for each unique user recognizable, non-repeated field maintained in or retrieved from the ILF or EIF through the execution of an elementary process.	The following fields are recognized by the Mail Distribution user: • Employee ID • Floor • Building Code
When two applications maintain and/or reference the same ILF/EIF, but each maintains/references separate DETs, count only the DETs being used by each application to size the ILF/EIF.	There is data of this type. Only the Employee ID, Floor, and Building Code are used by the Mail Distribution application.
Count a DET for each piece of data required by the user to establish a relationship with another ILF or EIF.	There is no data of this type.

The RET and DET totals for the employee ILF in the Mail Distribution application are shown in the following table.

RETs	DETs
• Employee information group	• Employee ID • Floor • Building Code
Total 1 RET	**Total** 3 DETs

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EIF Counting Examples

Introduction   This section uses a Human Resources (HR) application along with a Security application and a Pension system to illustrate procedures used to count data functions. In addition to this section, further examples are in the Case Studies included in the corresponding IFPUG documentation.

Contents   This section includes the following examples:

Summary Descriptions of EIF Examples

The examples for EIFs are described in the following table.

Example	Summary Description	Page
Referencing Data from Other Applications to generate output	This example identifies EIFs for an application that references data maintained by another application. The data is used to generate an external output.	1-31
Referencing Data from Another Application to use as part of an input process	This example also looks at referencing data from another application. This example identifies EIFs for an application that references data maintained by another application to use for an external input.	1-34
Providing Data to Other Applications	This example shows how you count when other applications retrieve a logical group of data from the application being counted.	1-37
Help Application	This example shows how the HR application counts a Help facility provided by a separate application.	1-38
Data Conversion	This section shows an example of counting when converting to a new application.	1-43
Transaction Input File	This example applies EIF counting rules to a transaction input file processed to add jobs to the Human Resources application.	1-45
Different Users/Different User View	This example shows how the view differs when an EIF is used by multiple applications.	1-47
Multiple Data Uses	This example shows multiple uses for the same data.	1-50

Example: Referencing Data from Other Applications

User Requirements   The user wants the Human Resources System to provide the ability to:

1. Enter, inquire, and report employee information

2. Interface with the Fixed Assets system to retrieve location information for each building. The location information includes name and description information.

Identify EIFs   From the user requirements, there are two groups of information:

- Employee information

- Location information

The following table shows the summary analysis to determine whether the employee information is an EIF.

EIF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	Yes. Users require the ability to inquire and report on employee information.
The group of data is referenced by, and external to, the application being counted.	No. The HR application being counted requires creating employee information.
The group of data is not maintained by the application being counted.	No. The HR application adds, changes, and deletes employee information.
The group of data is maintained in an ILF of another application.	Yes, but the rule does not apply because the ILF is maintained within the application being counted.

Based on the analysis, the employee information is not external to the HR application. It is maintained internally; therefore, it is not an EIF.

The following table shows the analysis to determine whether the location information is an EIF.

EIF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	Yes. Users require the ability to retrieve the information for employee reporting.
The group of data is referenced by, and external to, the application being counted.	Yes. It is maintained externally by the Fixed Asset application.
The group of data is not maintained by the application being counted.	Yes.
The group of data is maintained in an ILF of another application.	At first, it is not clear whether this rule applies. After asking users, we learn that they enter the information into the Fixed Asset application using a screen. Therefore, the group is an ILF and the rule applies.

The location information meets all the requirements for an EIF.

Count RETs and DETs

Count the number of data element types (DETs) and record element types (RETs).

For DETs, look at each field associated with the location EIF and determine whether the rules apply.

The following fields are referenced from the location EIF:

- Building Code
- Building Name
- Building Description
  - Line 1
  - Line 2
  - Line 3
- City
- State
- Country

The following table shows the summary analysis of the DET count.

EIF DET Counting Rules	Does the Rule Apply?
Count a DET for each unique user recognizable, non-repeated field maintained in or retrieved from the ILF or EIF through the execution of an elementary process.	All fields are user recognizable. The Building Description has three lines. Because these are repeating lines, count Building Description as one DET.
When two applications maintain and/or reference the same ILF/EIF, but each maintains/references separate DETs, count only the DETs being used by each application to size the ILF/EIF.	This data is maintained by the Fixed Asset System.
Count a DET for each piece of data required by the user to establish a relationship with another ILF or EIF.	There is no data of this type.

Count one DET for each field.

For RETs, identify subgroups based on the RET counting rules.

RET Counting Rules	Does the Rule Apply?
Count a RET for each optional or mandatory subgroup of the ILF or EIF. *Or*	The location information does not have subgroups.
If there are no subgroups, count the ILF or EIF as one RET.	Because there are no subgroups, count the location information EIF as one RET.

There are no subgroups; therefore, the location information EIF has only one RET.

The RET and DET totals for the location EIF are shown in the following table.

| RETs		DETs	

• Location data		• Building Code
		 • Building Name
		 • Building Description
		   Line 1
		   Line 2
		   Line 3
		 • City
		 • State
		 • Country	

Total	1 RET	**Total**	6 DETs

Example: <mark>Referencing Data from Another Application</mark>

User Requirements   The user requires the Human Resources application to provide the following capabilities:

- All hourly employees must be paid in United States dollars.

- When the user adds or changes employee information, the Human Resources application must access the Currency application to retrieve a conversion rate. After retrieving the conversion rate, the HR application converts the employee's local standard hourly rate to a U.S. hourly rate using the following calculation:

$$\frac{\text{Standard Hourly Rate}}{\text{Conversion Rate}} = \text{US Dollar Hourly Rate}$$

Data Model   The following diagram shows the relationships for this example.
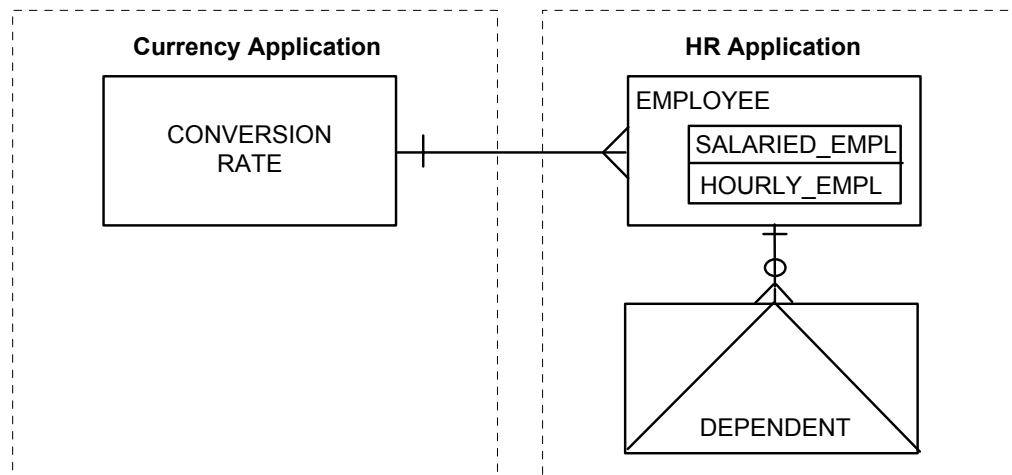
Legend:

▭	Entity Type
◸	Attribute Entity Type
▤	Entity Subtype
┼─<	Mandatory One-to-Many Relationship
┼─o<	Optional One-to-Many Relationship

The conversion information includes:

CURRENCY
  Conversion_Rate_To_Base_Currency
  Country

Identify EIFs   From the requirements, there are two groups of information:

- Conversion information

- Employee information

The following table shows the summary analysis to determine whether the conversion information is an EIF.

EIF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	Yes. Users require that the local currencies are converted to enable the HR application to maintain all needed employee data.
The group of data is referenced by, and external to, the application being counted.	Yes. The rule applies.
The group of data is not maintained by the application being counted.	Yes. The rule applies.
The group of data is maintained in an ILF of another application.	At first, it is not clear whether this rule applies for the conversion information. After asking users, we learn that the information is accessed from a wire service and is counted as an ILF in the Currency application. Therefore, the rule applies.

Because the Currency application provides the conversion rate for the HR application, the group of currency conversion data is an EIF for the HR application. Employee information was previously identified as an ILF.

Count RETs and DETs   Count the number of data element types (DETs) and record element types (RETs).

For DETs, look at each field associated with the conversion EIF and determine whether the rules apply. The following table shows the summary analysis of the DET count.

EIF DET Counting Rules	Does the Rule Apply?
Count a DET for each unique user recognizable, non-repeated field maintained in or retrieved from the ILF or EIF through the execution of an elementary process.	All fields are user recognizable.
When two applications maintain and/or reference the same ILF/EIF, but each maintains/references separate DETs, count only the DETs being used by each application to size the ILF/EIF.	This data is maintained by currency system.
Count a DET for each piece of data required by the user to establish a relationship with another ILF or EIF.	There is no data of this type.

Count one DET for each field.

For RETs, identify subgroups based on the RET counting rules.

RET Counting Rules	Does the Rule Apply?
Count a RET for each optional or mandatory subgroup of the ILF or EIF. *Or*	The conversion information is contained within one entity, therefore there are no subgroups.
If there are no subgroups, count the ILF or EIF as one RET.	Because there are no subgroups, count the conversion information as one RET.

There are no subgroups; therefore, the conversion information EIF has only one RET.

The RET and DET totals for the conversion information EIF are shown in the following table.

RETs		DETs	
• Conversion information		• Conversion rate • Country	
Total	1 RET	**Total**	2 DETs

Example: Providing Data to Other Applications

User Requirements

The user has the following requirements for the Currency application:

- Maintain conversion rates for other currencies to U.S. dollars.

- Provide an interface to enable other applications, such as Human Resources, to retrieve conversion information.

Identify EIFs

For this example, determine whether the conversion information is an EIF for the Currency application. The following table shows the summary analysis.

EIF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	Yes. Users require that the local currencies exchange rates are available to enable the Human Resources application to maintain all needed employee data.
The group of data is referenced by, and external to, the application being counted.	No. The Currency application is being counted, and the rates are maintained in that application.
The group of data is not maintained by the application being counted.	No. The rates are maintained by Currency application users.
The group of data is maintained in an ILF of another application.	At first, it is not clear whether the rule applies for the conversion information. After asking users, we learn that the information is accessed via a wire service and is counted as an ILF in the Currency application. This rule does not apply because the data is maintained within the application being counted.

The conversion information is not external to the Currency application; therefore, it is not counted as an EIF for the currency application.

The conversion information is an ILF for the Currency application based on the following rules for an ILF:

- The data is a logical group based on the user's view.

- Data is maintained within the Currency application.

- The data is an ILF for the Currency application.

See the previous example in this chapter to review how referencing currency rates may be counted as an EIF.

Example: Help Application

User Requirements

The user requires the Help system to provide:

1. The facility for a user to describe how each window is used to accomplish each business function available on the window.

2. The ability to change window help.

3. The ability to set up a definition, default values, and valid values for each field in the Human Resources application.

4. The ability to change field help.

5. The ability for the Human Resources application to retrieve window and field help for display.

Data Flow Diagram

The following diagram illustrates the data flow for this example.
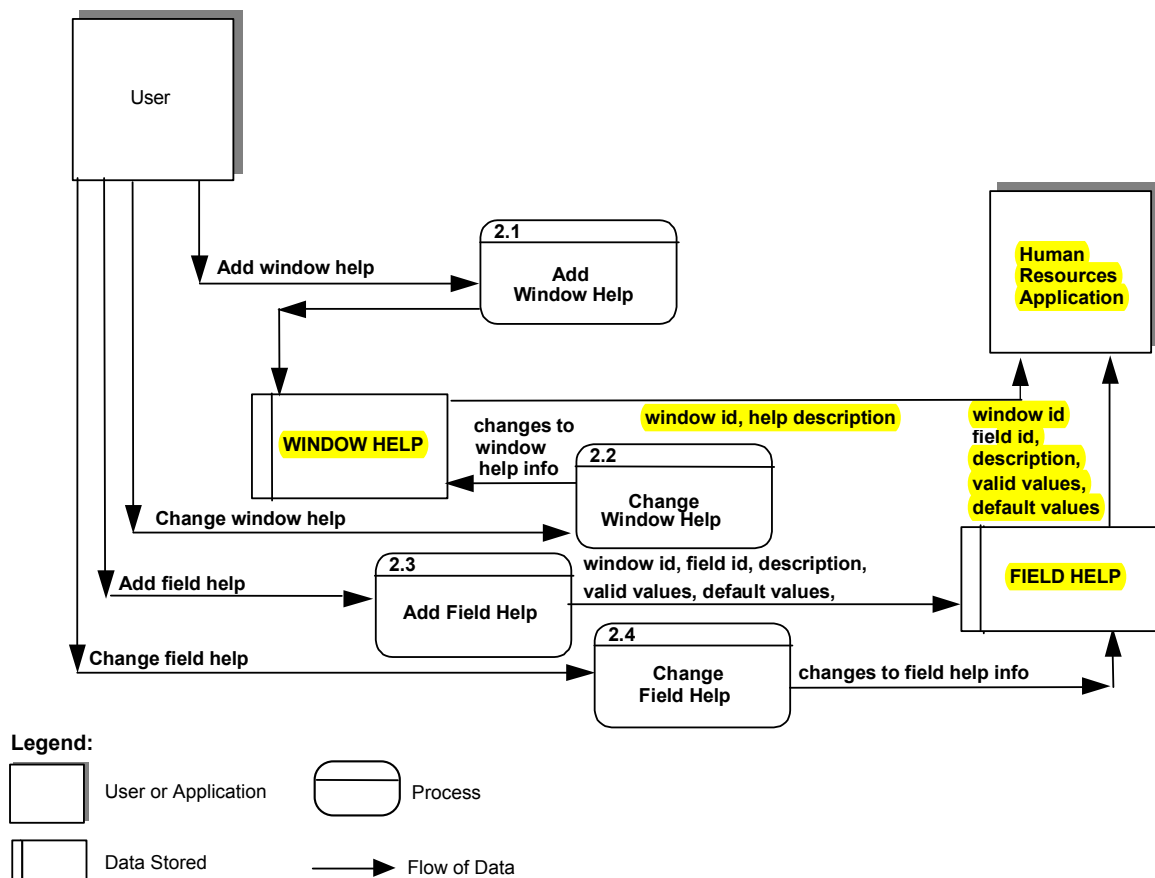
Identify EIFs   From the requirements for the Human Resources (HR) application, there are
two groups of data:

- Window help

- Field help

The following table shows the summary analysis to determine whether
window help is an EIF for the HR application.

EIF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	Yes. Users require a centralized window help facility to customize help.
The group of data is referenced by, and external to, the application being counted.	Yes. The data is external to the HR application.
The group of data is not maintained by the application being counted.	Yes. The rule applies.
The group of data is maintained in an ILF of another application.	Yes. It is counted as an ILF in the Help application.

Window help information is an EIF in the HR application because the
information is retrieved by the HR application. Window help is maintained in
the Help application, where it is counted as an ILF.

The following table shows the summary results of the analysis to determine
whether the field help is an EIF.

EIF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	Yes. Users require a centralized field help facility to customize help.
The group of data is referenced by, and external to, the application being counted.	Yes. Field help is maintained by the Help application, therefore, it is external to the HR application.
The group of data is not maintained by the application being counted.	Yes.
The group of data is maintained in an ILF of another application.	Yes.

Field help information is an EIF in the HR application because the
information is retrieved by the HR application. The field help information is
maintained in the Help system where it is counted as an ILF.

Count RETs and DETs   Count the number of data element types (DETs) and record element types (RETs).

For DETs, look at each field associated with the window and field help and use the DET counting rules to count DETs.

The fields for window help include:

- Window identifier

- Business function description.

The following table shows the DET analysis for window help.

EIF DET Counting Rules	Does the Rule Apply?
Count a DET for each unique user recognizable, non-repeated field maintained in or retrieved from the ILF or EIF through the execution of an elementary process.	All fields are user recognizable.
When two applications maintain and/or reference the same ILF/EIF, but each maintains/references separate DETs, count only the DETs being used by each application to size the ILF/EIF.	This data is maintained by the Help system.
Count a DET for each piece of data required by the user to establish a relationship with another ILF or EIF.	There is no data of this type.

The following list shows the fields for field help:

- Window identifier

- Field identifier

- Field description

- Default values

- Valid values

The following table shows the DET analysis for field help.

EIF DET Counting Rules	Does the Rule Apply?
Count a DET for each unique user recognizable, non-repeated field maintained in or retrieved from the ILF or EIF through the execution of an elementary process.	All fields are user recognizable.
When two applications maintain and/or reference the same ILF/EIF, but each maintains/references separate DETs, count only the DETs being used by each application to size the ILF/EIF.	This data is maintained by the Help system.
Count a DET for each piece of data required by the user to establish a relationship with another ILF or EIF.	Window identifier establishes a relationship with Window Help.

For RETs, identify subgroups based on the RET counting rules.

RET Counting Rules	Does the Rule Apply?
Count a RET for each optional or mandatory subgroup of the ILF or EIF. *Or*	There are no subgroups for either the window help or field help EIF.
If there are no subgroups, count the ILF or EIF as one RET.	Because there are no subgroups, count one RET for each EIF (window help and field help).

There are no subgroups; therefore, the help information has only one RET for each EIF.

The RET and DET totals for the window help EIF are shown in the following table.

RETs		DETs	
• Window help information		• Window identifier	
		• Business function description	
Total	1 RET	**Total**	2 DETs

The RET and DET totals for the <mark>field help EIF</mark> are shown in the following table.

| RETs	DETs
• Field help information	• Window identifier
	• Field identifier
	• Field description
	• Default values
	• Valid values
Total 1 RET	**Total** 5 DETs

Example: Data Conversion

User Requirements
An organization has purchased a new HR application package. The organization is required to convert its employee file from its existing HR System to a replacement system.

The old system did not provide the capability to maintain employee dependent information. The dependent information is initialized when existing employees are migrated to the new application.

Data Model
The following diagram shows the data for the two applications.
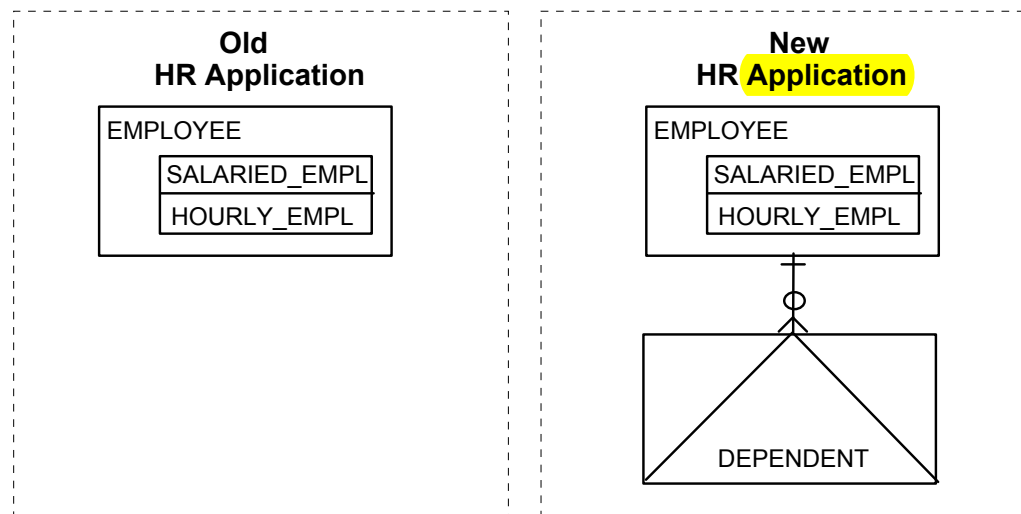
Legend:

☐	Entity Type
◺	Attribute Entity Type
▤	Entity Subtype
┼──o<	Optional One-to-Many Relationship

The employee file from the old HR application is used to add employees to the new HR application.

Identify EIFs   From the user requirements, determine whether the old employee file is an EIF. The following table shows the summary analysis.

EIF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	No. The old employee file is not a logical group of data from the user perspective.
The group of data is referenced by, and external to, the application being counted.	No. While it is external, it is not referenced, but it is used as an update.
The group of data is not maintained by the application being counted.	Yes. It is not maintained by the HR application.
The group of data is maintained in an ILF of another application.	Yes. It is maintained as an ILF by the old HR system.

The file of employee information is a transaction file of employee information that is migrated to the new system. The conversion process maintains the employee information after it enters the new HR application boundary.

The old employee file is not a logical group of data from the new HR application user perspective, therefore, it is not an EIF. Refer to EI/EO/EQ Counting Examples to see how the old employee file may be counted as an external input.

Example: Transaction Input File

User Requirements   The user requires the ability to:

1. Add, change, delete, inquire, and report on job information online

2. Add and change job information in batch mode.

Record Layout   The following diagram shows the record layout for this example for adding and changing job information in batch mode.

```
           12345678910123456789012345678901234567890123456789012345678901234567890123
4567890
0          1         2         3         4         5         6         7         8
1                ADD│01│SRENG│SENIOR ENGINEER INFORMATION SYSTEMS│05│
2                ADD│02│SRENG│01│STARTS AT PAY GRADE 05          │
3                ADD│02│SRENG│02│OTHER PAY GRADES:06 AND 07      │
4                CHG│01│STENG│                             │04│
5                CHG│02│STENG│02│OTHER PAY GRADES:05 AND 06      │
6
7
9
0
1
2
3
4
5
6
7
9
0
1
2
3
4
```

Record Descriptions

The following table includes descriptions for each record type.

Record	Position	Description
01	1-3	Transaction type
	4-5	Record type
	6-10	Job number
	11-45	Job name
	46-47	Job pay grade
02	1-3	Transaction type
	4-5	Record type
	6-10	Job ID
	11-12	Job description line number
	13-41	Job description lines

Identify EIFs

From the user requirements, determine whether the transaction file is an EIF. The following table shows the summary analysis.

EIF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	Yes. Data is grouped into transactions which enter the application boundary to maintain the job ILF.
The group of data is referenced by, and external to, the application being counted.	Yes. The transaction file is outside the boundary ready to be processed.
The group of data is not maintained by the application being counted.	No. It is not maintained.
The group of data is maintained in an ILF of another application.	No. The transactions entering the boundary to update the job ILF make up the elementary processes. There is no elementary process to update the transaction file.

There are no EIFs for this example. Refer to EI/EO/EQ Counting Examples to see the explanation of how an input transaction file may be counted as an external input.

Example: Different Users/Different User View

User Requirements   The HR user requires the ability to maintain information on each new employee.

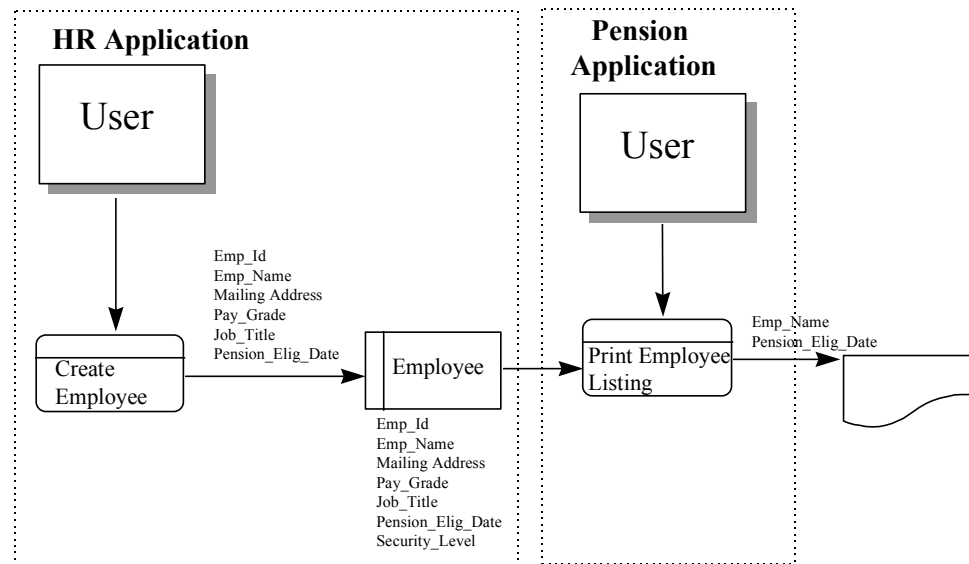The information that must be maintained by the HR user includes:

- Employee ID
- Employee Name
- Employee Mailing Address
- Employee Pay Grade
- Employee Job Title

As a result of creating a new employee record, the employee's Pension Eligibility Date is automatically calculated and saved with the other employee information.

The Pension user requires the ability to generate a list of employees with their anticipated Pension Eligibility date.

Data Flow Diagram   The following diagram shows the data flow for this example.

HR Application

User

Emp_Id
Emp_Name
Mailing Address
Pay_Grade
Job_Title
Pension_Elig_Date

Create Employee

Employee

Emp_Id
Emp_Name
Mailing Address
Pay_Grade
Job_Title
Pension_Elig_Date
Security_Level

Pension Application

User

Print Employee Listing

Emp_Name
Pension_Elig_Date

Identify EIFs From a previous HR application example, we know that the employee information is not an EIF for the HR application.

The following table shows the summary analysis to determine whether the employee information is an EIF for the Pension application.

EIF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	Yes. The fields are recognized by the Pension user.
The group of data is referenced by, and external to, the application being counted.	Yes. All data is external to the Pension Application.
The group of data is not maintained by the application being counted.	Yes. The data is not maintained by the Pension application.
The group of data is maintained in an ILF of another application.	Yes. The data is maintained by the HR application.

The employee information meets all the requirements for an EIF for the Pension application.

Count RETs and DETs Count the number of data element types (DETs) and record element types (RETs).

For DETs, look at each field associated with the employee EIF for the Pension application. Use the DET counting rules to count DETs.

The fields for the employee information include:

- Employee ID
- Employee Name
- Employee Mailing Address
- Employee Pay Grade
- Employee Job Title
- Pension Eligibility Date

The following table shows the DET analysis for employee information for the Pension application.

EIF DET Counting Rules	Does the Rule Apply?
Count a DET for each unique user recognizable, non-repeated field maintained in or retrieved from the ILF or EIF through the execution of an elementary process.	Only the Employee Name and the Pension Eligibility Date are recognized by the Pension user.
When two applications maintain and/or reference the same ILF/EIF, but each maintains/references separate DETs, count only the DETs being used by each application to size the ILF/EIF.	The Pension application only uses the Employee Name and the Pension Eligibility Date.
Count a DET for each piece of data required by the user to establish a relationship with another ILF or EIF.	There is no data of this type.

The following list shows the fields for the employee EIF for the Pension application:

- Employee Name
- Pension Eligibility Date

For RETs, identify subgroups based on the RET counting rules.

RET Counting Rules	Does the Rule Apply?
Count a RET for each optional or mandatory subgroup of the ILF or EIF.	There are no subgroups.
Or	
If there are no subgroups, count the ILF or EIF as one RET.	Because there are no subgroups, count one RET for each EIF.

There are no subgroups; therefore the employee information has only one RET.

The RET and DET totals for the Employee EIF in the Pension application.

RETs		DETs	
• Employee information		• Employee Name • Pension Eligibility Date	
Total	1 RET	Total	2 DETs

Example: Multiple Data Uses

User
Requirements

The HR user requires the ability to generate a listing of all of the employees.

The information that must be displayed for each employee includes:

- Employee ID
- Employee Name

Data Flow
Diagram

The following diagram shows the data flow for this example.
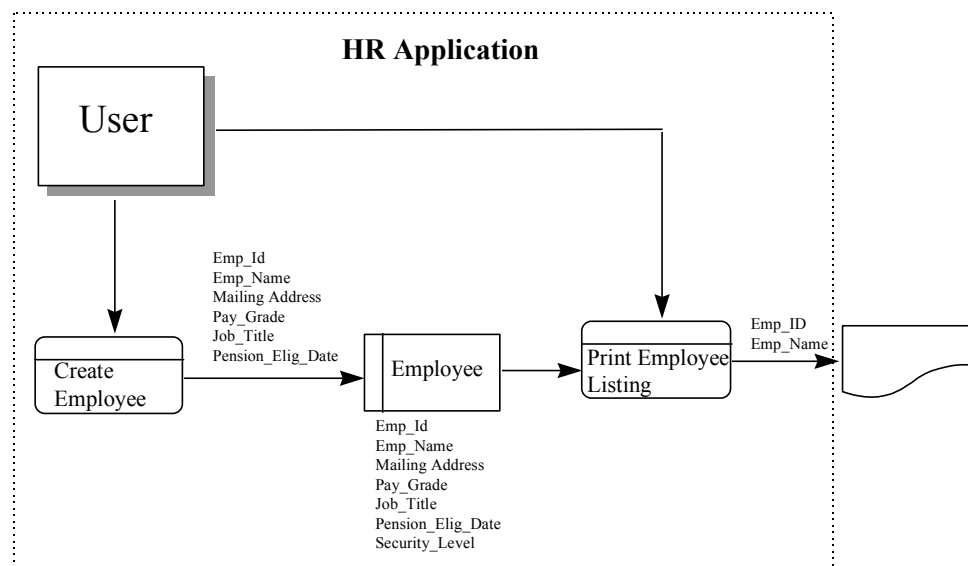
Identify EIFs   The following table shows the summary analysis to determine whether the employee information that is used to create the employee listing is an EIF for the HR application.

EIF Identification Rules	Does the Rule Apply?
The group of data or control information is logical and user identifiable.	Yes. All data is recognized by the user.
The group of data is referenced by, and external to, the application being counted.	No. The data and the process of producing the employee listing is not external to the HR application.
The group of data is not maintained by the application being counted.	No. The data is maintained by the application.
The group of data is maintained in an ILF of another application.	Not applicable.

The employee listing information used for creating the employee information is not an EIF for the HR application.

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Transactional Function Counting Examples

Introduction This section uses a Human Resources (HR) application to illustrate procedures used to count transactional functions. In addition to this section, examples are in the Case Studies included in the complementary IFPUG documentation.

Caution: The examples in this section and throughout the manual have two purposes:

1. To illustrate how the function point counting rules are applied for a given set of user requirements.

2. To enable you to practice using the counting procedures.

Each counter must:

- Analyze the specific user requirements that apply for each project or application being counted, and

- Count based on those requirements.

Contents This section explains the organization of the examples and includes detailed examples for each transactional function.

Organization of the Counting Examples

This section explains how the examples are presented.
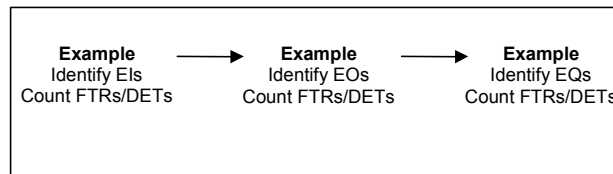
Outline of the Organization

The following list outlines the sequence of information in the detailed examples.

For each example:

- The EIs, EOs, and EQs are identified.

- The FTRs and DETs that make up the functional complexity are counted.

Diagram of the Organization

The following diagram illustrates the organization of the examples.

```
┌─────────────────────────────────────────────────────────────┐
│   Example      ──────▶   Example     ──────▶   Example        │
│  Identify EIs          Identify EOs          Identify EQs      │
│ Count FTRs/DETs       Count FTRs/DETs       Count FTRs/DETs    │
│                                                               │
└─────────────────────────────────────────────────────────────┘
```
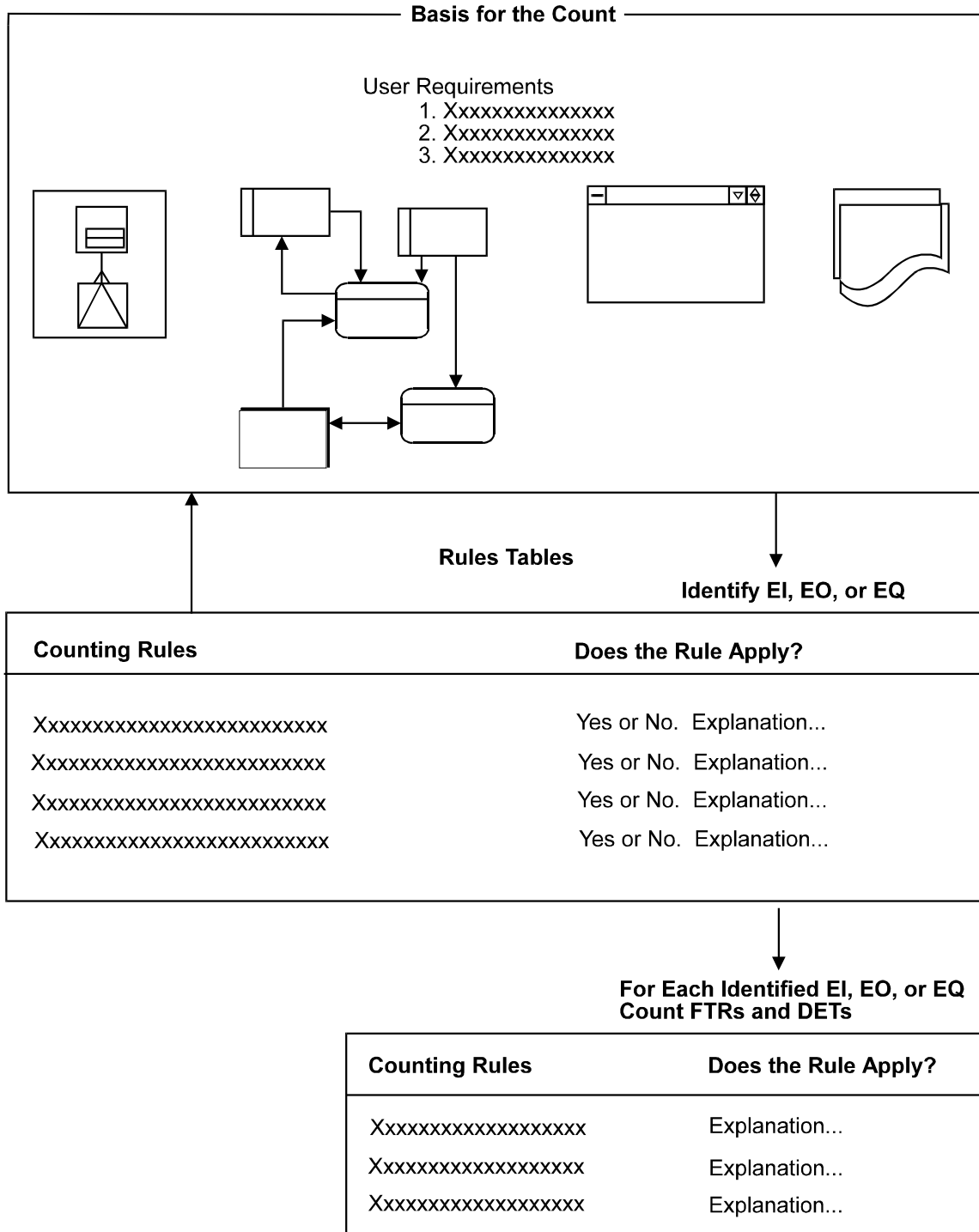
Count for Each Example

Each example includes the following components:

- Basis for the count
- Tables applying the counting rules

Diagram of Components

The following diagram illustrates the components for each example and the flow of information.

Basis for the Count

User Requirements
   1. Xxxxxxxxxxxxxxx
   2. Xxxxxxxxxxxxxx
   3. Xxxxxxxxxxxxxx

Rules Tables

Identify EI, EO, or EQ

Counting Rules	Does the Rule Apply?
Xxxxxxxxxxxxxxxxxxxxxxxxxxxx	Yes or No. Explanation...
Xxxxxxxxxxxxxxxxxxxxxxxxxxxx	Yes or No. Explanation...
Xxxxxxxxxxxxxxxxxxxxxxxxxxxx	Yes or No. Explanation...
Xxxxxxxxxxxxxxxxxxxxxxxxxxxx	Yes or No. Explanation...

For Each Identified EI, EO, or EQ
Count FTRs and DETs

Counting Rules	Does the Rule Apply?
Xxxxxxxxxxxxxxxxxxx	Explanation...
Xxxxxxxxxxxxxxxxxxx	Explanation...
Xxxxxxxxxxxxxxxxxxx	Explanation...

Basis for the Count

The basis for the count begins each example. As shown in the diagram of components, the count may be based on the following components included in the examples:

- User requirements

- Data and process models

- Windows, screens, or reports

Note: All components in the diagram are not included in all examples. In some examples, the requirements stand alone as the basis for the count. Other examples include a data or process model, windows, screens, and reports.

Rules Tables

The analysis to identify functions is presented in a table that lists the counting rules for the function type. The rules are applied to the components that make up the basis for the count. The analysis is explained in the table in the column "Does the Rule Apply?"

Note: If all the rules apply, the example is counted as an EI, EO, or EQ.

The next tables show the rules and explanation for types that make up the complexity for each function type identified.

Shared Rules for All Transactional Function Types

The process to analyze all the examples follows the process described earlier in this chapter.
Steps of the process are concerned with applying the rules for identifying Elementary Processes,
the Primary Intent and the classification of the Transactional Function type into EI, EO, or EQ.
The following tables list the rules that must be applied:

Elementary Processing Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	
The process is self-contained and leaves the business of the application in a consistent state.	

The answer to both questions must be **'YES'** for the Transactional Function to be an Elementary
Process.

Primary Intent	
EI	To maintain an ILF or alter the behavior of the system.
EO	To present information to a user.
	It presents data that is calculated or derived, it updates 1 or more ILFs, or it alters the behavior of the system.
EQ	To present information to a user.
	It presents only data that is retrieved from 1 or more ILFs or EIFs.

Use the description that best matches the primary intent of the Transactional Function type to
determine whether it is an EI, EO or EQ. This can be determined by careful and accurate
interpretation of the user requirements for the function.

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Elementary Process Identification Examples

Introduction   This section uses several examples to illustrate procedures for identifying elementary processes.

Contents   This section includes the following examples:

Summary Descriptions of Elementary Process Identification Counting Examples

The examples for elementary process identification are described in the following table.

Example	Summary Description	Page
New Employee/ Dependent Data	This example shows that multiple processes can make up one elementary process.	2-9
Print a Check/ Mark It Paid	This example illustrates the concept of primary intent of an elementary process.	2-12
View Job Assignments	This example shows that entering selection criteria for a report is not an elementary process.	2-14
Print Job Assignments/ Save Criteria	This example shows explicitly saving selection criteria for a later use is a separate elementary process.	2-17
Employee/ Interview Information	This illustrates another example of multiple processes making up one elementary process.	2-19
Employee/ License Information	This is a third example of multiple processes making up one elementary process.	2-22

Example: New Employee/Dependent Data

User Requirements

If a user adds a new employee, the user is required to enter

1. employee setup (basic) data and

2. dependent information if the number of dependents is greater than zero.

A transaction file is created during the update of the employee information. This transaction file is sent periodically to the Benefits System.

Adding Employee Information without Dependent Information

Determine whether adding the employee information without the associated dependent information is an elementary process.

The following table shows the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	No, when an employee has dependents, the dependent's information must be included to represent the user requirement to add an employee.
The process is self-contained and leaves the business of the application in a consistent state.	No, when an employee has dependents the business is not in a consistent state after entering only the employee information.

Adding the employee information without the associated dependent information does not meet the requirements of an elementary process.

Adding only Dependent Information

Determine whether adding only the dependent information without the employee information is an elementary process.

The following table shows the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	No, this activity is apparently not meaningful to the user because it can not be executed independent of maintaining an employee.
The process is self-contained and leaves the business of the application in a consistent state.	Not Applicable.

Adding the dependent information without the associated employee information does not meet the requirements of an elementary process.

Adding an Employee with Dependent Information

For an employee who has dependents, determine whether adding the employee information with the associated dependent information is an elementary process.

The following table shows the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	Yes, together employee and dependent information are used to add an employee to the HR system.
The process is self-contained and leaves the business of the application in a consistent state.	Yes, this process is meaningful by itself and all necessary information is added to the HR application so the business is left in a consistent state (update file can be created and sent to Benefits system).

Adding the employee information with the dependent information meets the requirements of an elementary process.

Send the Transaction File to the Benefits System

Determine whether sending the transactions file to the Benefits System is an additional elementary process.

The following table shows the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	Yes, this internally triggered process reflects a separate user requirement that could have been implemented as an independent process.
The process is self-contained and leaves the business of the application in a consistent state.	Yes, this process is self-contained, and after the creation of the record on the transaction file that is used to update the Benefits application, the system is in a consistent state.

Sending the transaction file to the Benefits System meets the requirements of an elementary process.

Conclusions

There could be different implementations of the user requirement to add dependent(s) to an employee. For example:

- a data entry field called <u>Number of Dependents</u> on the employee screen which triggers the display of the dependent screen

- a button which displays the dependent's screen

- a menu item on the employee screen which displays the dependent's screen

- the possibility to enter dependent(s) on the employee screen

Irrespective of the implementation, there is still one elementary process, adding employee including dependents.

Example: Print a Check/Mark It Paid

**User
Requirements**   Print a check and, as a result, mark the account as paid. All data printed on
the check is already stored in the check file.

The following diagram shows the data flow for this example.
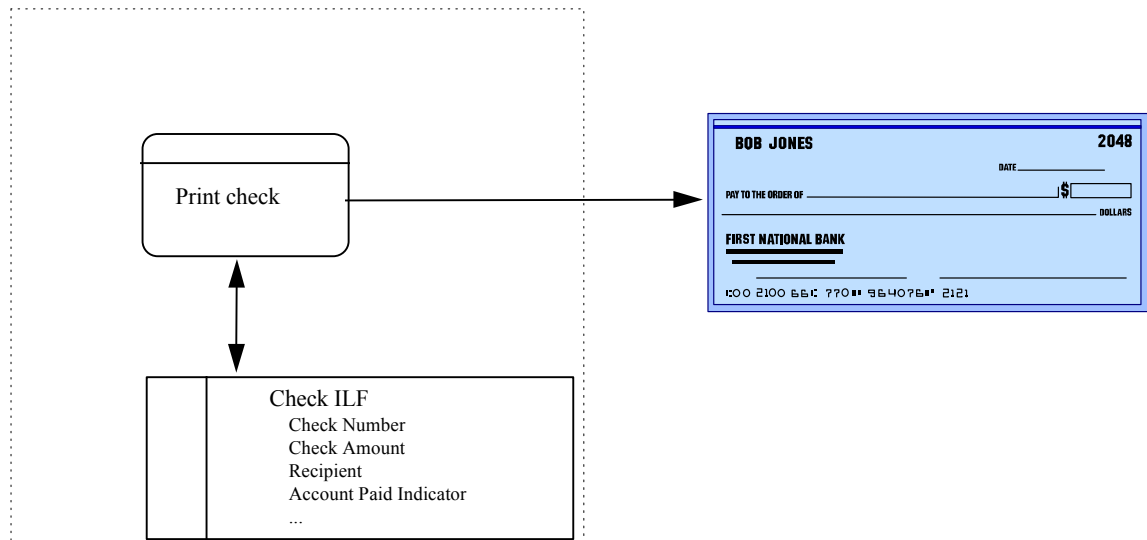
**Marking the
Account as
Paid**   Determine whether marking the account as paid is an elementary process.

The following table shows the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	No, together the printing and marking the field are required to print the check.
The process is self-contained and leaves the business of the application in a consistent state.	No, the process is not meaningful by itself and both are required.

Marking the account as paid does not meet the requirements for an elementary
process.

Printing the Check and Marking the Account as Paid

Determine whether printing the check and marking the account as paid is an elementary process.

The following table shows the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	Yes, together the printing and marking the field are required to print the check.
The process is self-contained and leaves the business of the application in a consistent state.	Yes, the process is meaningful by itself and both printing and marking are required to complete the process.

Printing the check and marking the account as paid meets the requirements for an Elementary Process.

The user requirement is to print the check. Marking the field Account Paid Indicator is part of the printing process. Printing and marking together are the smallest unit of activity that is meaningful to the user. The entire process is self-contained and leaves the business of the application in a consistent state.

Example: <mark>View Job Assignments</mark>

User Requirements   View a list of the job assignments within a date range. The user will be able to enter the selection criteria. There is no requirement to store the selection criteria once the report has been generated.

The following diagram shows the data flow for this example.

Assignment List Criteria		
Employee ID	[ ]	
Start Date	[ ]	**Print**
End Date	[ ]	**Cancel**

Enter Selection Criteria

Determine whether entering the selection criteria (without viewing the job assignments) is an elementary process.

The following table shows the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	No, together entering the selection criteria and viewing a list are required to be meaningful to the user.
The process is self-contained and leaves the business of the application in a consistent state.	No, it is not self-contained because it cannot be performed independently of viewing the list.

Entering the selection criteria without viewing the job assignments does not meet the requirements for an elementary process.

View Job Assignments

Determine if viewing the job assignments (without entering the selection criteria) is an elementary process.

The following table shows the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	No, together entering the selection criteria and viewing a list are required to be meaningful to the user.
The process is self-contained and leaves the business of the application in a consistent state.	No, it is not self-contained because it cannot be performed independently by entering the selection criteria.

Viewing the job assignments without entering the selection criteria does not meet the requirements for an elementary process.

Enter Selection Criteria and View Job Assignments

==Determine whether entering the selection criteria and viewing the job assignments is an elementary process.==

The following table shows the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	Yes, together entering the selection criteria and viewing a list are required to be meaningful to the user.
The process is self-contained and leaves the business of the application in a consistent state.	Yes, it is self-contained because both have to be performed to leave the business in a consistent state.

Entering the selection criteria and viewing the job assignments meets the criteria for an elementary process.

Control information is the input side of an EO or EQ. The request specifying what and/or how data is to be retrieved or generated is part of the elementary process to provide the user data and is not an elementary process itself.

Entering the selection criterion is not the smallest unit of activity that is meaningful to the user. It is not self-contained because it cannot be performed independently of producing the report. Entering the selection criteria and generating the report together comprise the smallest unit of activity that is meaningful to the user, is self-contained and leaves the business in a consistent state.

Example: Print Job Assignments/Save Criteria

User Requirements   Print a job assignment list between a date range. The user will be able to enter the selection criteria. There is a requirement to enable the user to save the selection criteria for later use.

The following diagram shows the data flow for this example.
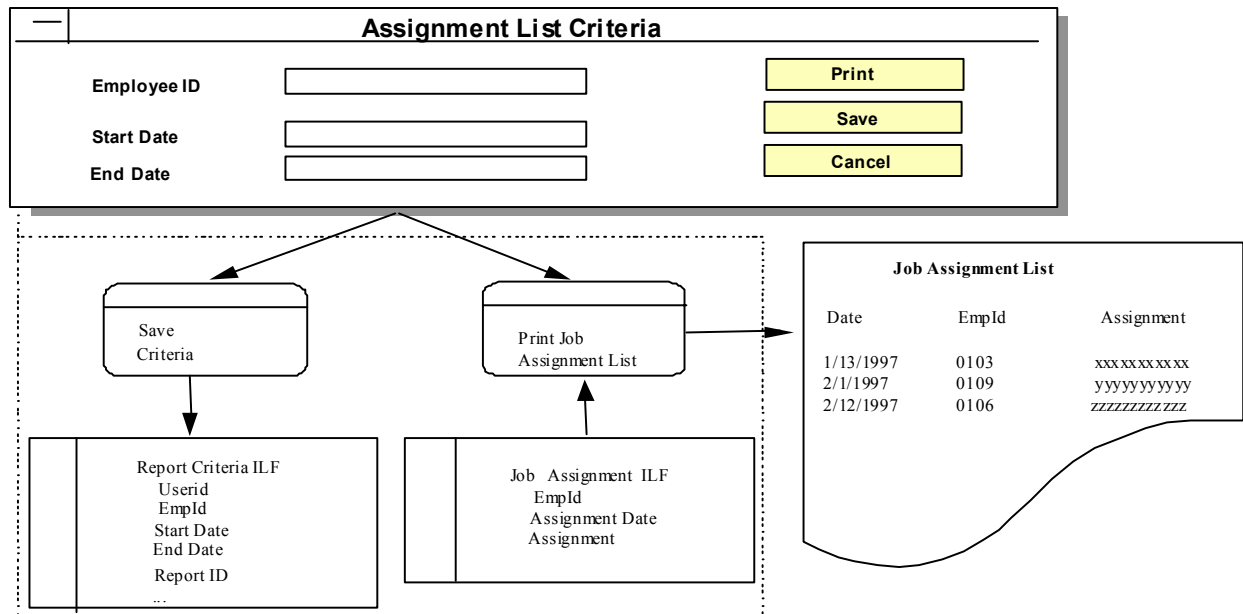
**Save
Selection
Criteria**

Determine whether saving the selection criteria (without printing a job assignment list) is an elementary process.

The following table shows the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	Yes, saving the selection criteria is the smallest activity and is meaningful to the user.
The process is self-contained and leaves the business of the application in a consistent state.	Yes, saving the selection criteria can be performed independently of printing a job assignment list.

Saving the selection criteria without printing a job assignment list does meet the requirements for an elementary process.

**Print Job
Assignments**

Determine whether printing a job assignment list, whether or not the selection criteria is saved, is an elementary process.

The following table shows the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	Yes, printing a job assignment list is the smallest activity that is meaningful to the user.
The process is self-contained and leaves the business of the application in a consistent state.	Yes, printing a job assignment list can be performed independently of saving selection criteria.

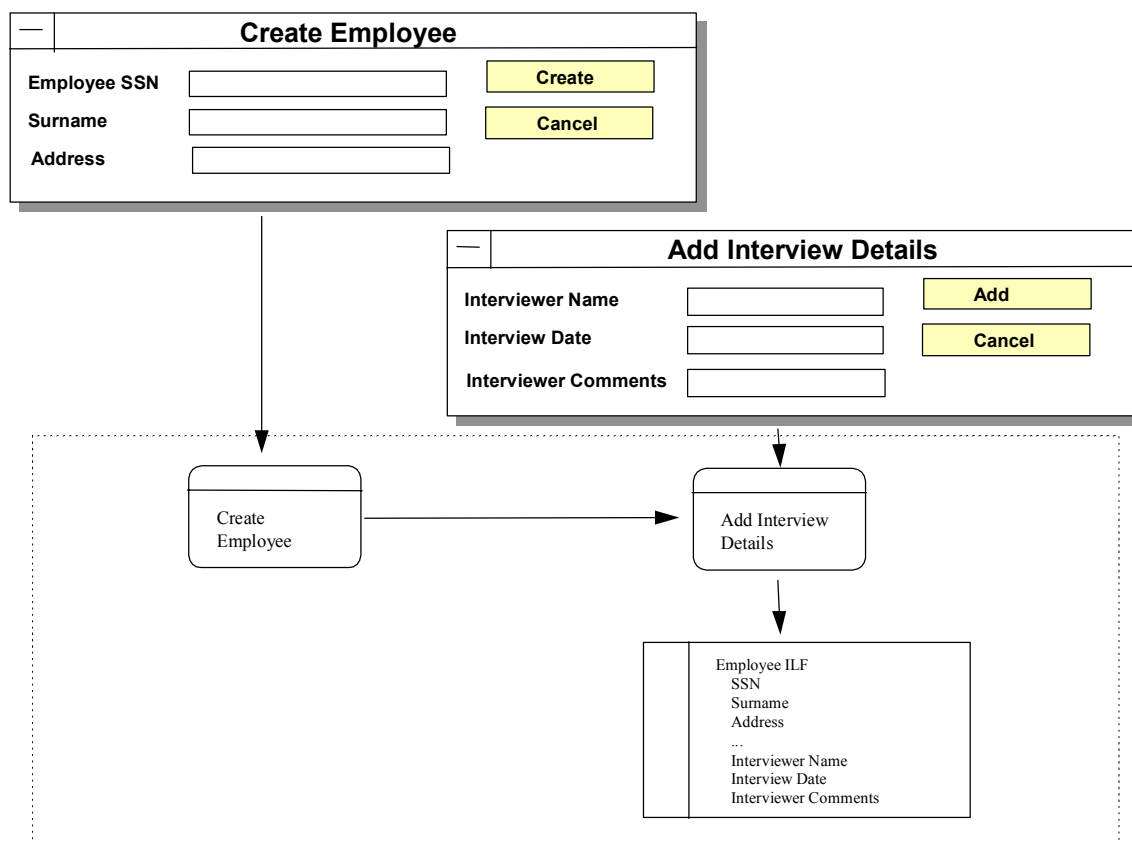Printing a job assignment list is an elementary process.

The entering of selection criteria is indeed meaningful to the user because the user can explicitly save the criteria. Either printing the report or saving the criteria can be performed independently, and both leave the business in a consistent state.

Both processes, storing the selection criteria, and generating the report, are self-contained, are meaningful to the business, and leave the business in a consistent state. According to the Elementary Process Identification Rules, there are two Elementary Processes.

Example: Employee/Interview Information

User Requirements

When adding a new employee, in addition to the employee's personal data (i.e., Social Security Number, surname, address, etc.), the employee's interview details must be entered. The interview information includes the interviewer's name, the interview date, and the interviewer's comments.

The following diagram shows the data flow for this example.

Create Employee

Employee SSN

Surname

Address

Create

Cancel

Add Interview Details

Interviewer Name

Interview Date

Interviewer Comments

Add

Cancel

Create Employee → Add Interview Details

Employee ILF
SSN
Surname
Address
...
Interviewer Name
Interview Date
Interviewer Comments

Entering the Employee's Personal Data

Determine whether entering only the employee's personal information is an Elementary Process.

The following table shows the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	No, together entering the employee's personal data and entering employee's interview details are required to be meaningful to the user.
The process is self-contained and leaves the business of the application in a consistent state.	No, it is not self-contained because it cannot be performed independently of entering the employee's interview detail.

Entering the employee's personal information without entering the interview details does not meet the requirements for an elementary process.

Entering Employee's Interview Details

Determine if entering only the employee's interview details is an elementary process.

The following table shows the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	No, together entering the employee's personal data and entering employee's interview details are required to be meaningful to the user.
The process is self-contained and leaves the business of the application in a consistent state.	No, it is not self-contained because it cannot be performed independently of entering the employee's personal data.

Entering the employee's interview details without the personal data does not meet the requirements for an elementary process.

**Entering the
Employee's
Personal
Data and
Interview
Details**

Determine whether entering the employee's personal data along with the interview details is an elementary process.

The following table shows the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	Yes, together entering the employee's personal data and entering employee's interview details are required to be meaningful to the user.
The process is self-contained and leaves the business of the application in a consistent state.	Yes, it is self-contained because it leaves the business of the application being counted in a consistent state.

Conclusion

If two input processes are always sequential and dependent (step one and step two are mandatory), then there is one elementary process and one function.

A new employee cannot be recorded until both the employee's personnel data and the employee's interview details are entered. Entering the employee's personnel data alone is not the smallest unit of activity that is meaningful to a user in the business and does not leave the business of the application in a consistent state.

According to the Elementary Process identification rules, there is only one Elementary Process.

Example: Employee/License Information

User
Requirements
When adding a new employee, the employee data is entered for Social Security Number, name, address, and whether or not the employee has a driver's license. If the employee does have a driver's license, a secondary process must be completed to record the employee's driver's license number, classification(s), and expiration date.

The following diagram shows the data flow for this example.
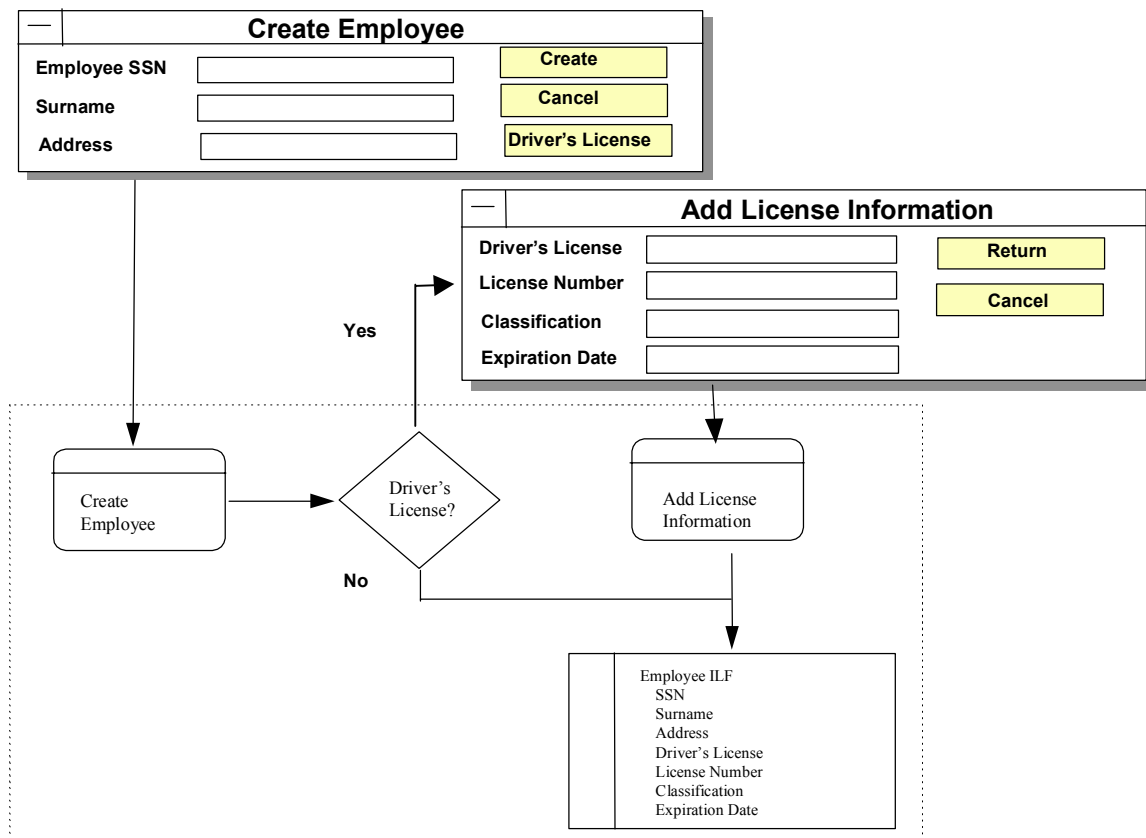
Adding an Employee with No Drivers License

Determine whether adding only the employee's personal information is an elementary process for an employee who does not have a driver's license.

The following table show the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	Yes, adding an employee is the smallest activity and is meaningful to the user.
The process is self-contained and leaves the business of the application in a consistent state.	Yes, it is self-contained, because adding an employee leaves the business of the application being counted in a consistent state.

Adding the employee information without adding the license information does meet the requirements of an elementary process for an employee without a drivers license.

Adding License Information

Determine whether entering the drivers license information without the employee's personal information is an elementary process.

The following table shows the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	No, recording the employee license is not possible without the activity of adding an employee, therefore it is not meaningful to the user.
The process is self-contained and leaves the business of the application in a consistent state.	No, it is not self-contained because it cannot be performed independently by entering the employee's personal data.

Entering the drivers license information without entering the employee's personal information does not meet the requirements for an elementary process.

Adding Employee and License Information

Determine whether entering an employee's personal information together with the associated license information is an elementary process.

The following table shows the analysis.

Elementary Process Counting Rules	Does the Rule Apply?
The process is the smallest unit of activity that is meaningful to the user.	Yes, adding an employee and recording the employee license is the smallest activity and is meaningful to the user.
The process is self-contained and leaves the business of the application in a consistent state.	Yes, it is self-contained, because adding an employee and recording the employee license leaves the business of the application being counted in a consistent state.

Conclusion

If two input processes are always sequential and dependent, but the second process is optional (but is mandatory if it applies), then there is one elementary process.

There is one Elementary Process, Adding Employee. If an employee does not have a license the step "Add License Information" is not relevant. If an employee does have a driver's license, a secondary screen must be completed to complete the Elementary Process and leave the business of the application in a consistent state

EI Counting Examples

Introduction This section uses a Human Resources (HR) application to illustrate procedures to count external inputs. In addition to this section, examples are in the Case Studies.

Contents This section includes the following examples:

Summary Descriptions of EI Counting Examples

The examples for external inputs are listed and described in the following table.

Example	Summary Description	Page
Control Information	This example looks at control information used for reporting.	2-27
Screen Input	This example illustrates counting an online add transaction via a screen.	2-31
Batch with Multiple EIs and Duplicate EIs	This example shows how to count a transaction file with multiple types or formatted record types.	2-35
Correcting Suspended Transactions	This example illustrates counting making corrections to jobs suspended to a file during batch processing of adding or changing jobs.	2-39
EI with Multiple File Types Referenced	This example illustrates using a data flow diagram to count an external input that references multiple files.	2-42
Data Conversion	This example shows how to count the process of converting a group of data to a new format with additional data elements.	2-46
Referencing Data from Another Application	This example looks at why an external interface file (discussed in Part !,Chapter 6) is not counted as an external input.	2-49
EI with Screen Output –1	This example illustrates an EI with a calculated field that is displayed.	2-51
EI with Screen Output –2	This example illustrates an EI with a calculated field and embedded EQs.	2-54

Example: <mark>Control Information</mark>

User Requirements   The user requires the ability to control how and when assignment reports are printed. The following list shows the specific user requirements for generating the report:

1. Control the following aspects of report processing:

   - Sort sequence

   - Printer port

   - Whether or not to generate a microfiche copy

   - Whether or not to generate a paper copy

2. Save the job assignment reporting controls.

3. Make and save changes.

4. Send a message to confirm that the controls for the assignment reports have been added or changed, and that the report is being generated.

Note: This example shows only the requirement to add the group of assignment report control information. The Case Studies illustrate counting the entire user requirement.

Example   The following Job Assignments Report window is used to establish controls
Window   for reporting assignments.

```
┌──────────────────────────────────────────────────────────────────────┐
│ ─          Human Resources System                              ▽   ⇕  │
├──────────────────────────────────────────────────────────────────────┤
│   Employee      Jobs      Assignments      Locations        Help      │
│ ┌──────────────────────────────────────────────────────────────────┐ │
│ │ ─                Job Asssignments  Report                         │ │
│ │      ┌─ Sort Sequence ──────────┐                                 │ │
│ │      │ ┌─┐                      │                                 │ │
│ │      │ │3│  Job ID              │                                 │ │
│ │      │ └─┘                      │                                 │ │
│ │      │ ┌─┐                      │                                 │ │
│ │      │ │2│  Employee Number     │                                 │ │
│ │      │ └─┘                      │                                 │ │
│ │      │ ┌─┐                      │                                 │ │
│ │      │ │1│  Employee Name       │                                 │ │
│ │      │ └─┘                      │                                 │ │
│ │      │ Identify with 1, 2 & 3   │                                 │ │
│ │      └──────────────────────────┘                                 │ │
│ │      ┌─ Printer Port ───────────┐                                 │ │
│ │      │ ( )  LPT 1               │                                 │ │
│ │      │                          │                                 │ │
│ │      │ ( )  LPT 2               │            ┌──────────┐         │ │
│ │      │                          │            │   OK     │         │ │
│ │      │ ( )  LPT 3               │            └──────────┘         │ │
│ │      └──────────────────────────┘            ┌──────────┐         │ │
│ │        ☐  Generate Michrofiche Copy          │  Cancel  │         │ │
│ │                                              └──────────┘         │ │
│ │        ☒  Generate Paper Copy                ┌──────────┐         │ │
│ │                                              │ Restore  │         │ │
│ │                                              └──────────┘         │ │
│ └──────────────────────────────────────────────────────────────────┘ │
└──────────────────────────────────────────────────────────────────────┘
   JR-1
        ┌──────────────┐
        │     OK       │     Processes report request
        └──────────────┘
        ┌──────────────┐
        │   Cancel     │     Returns to pull down menu
        └──────────────┘
        ┌──────────────┐
        │   Restore    │     Restores previous values
        └──────────────┘
```

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EI?	Yes. The primary intent is to maintain an ILF.

Step 3. Validate against the EI Counting Rules

EI Counting Rules	Does the Rule Apply?
The data or control information is received from outside the application boundary.	Yes.
At least one ILF is maintained if the data entering the boundary is not control information that alters the behavior of the system.	The data entering the boundary will eventually be used as control data. It is business data stored on the Report Control ILF.
For the identified process, <u>one</u> of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external inputs for the application.	Yes. No other EI has been identified that performs this function.
• The set of data elements identified is different from the sets identified for other external inputs for the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external inputs in the application.	Not applicable.

Conclusion: <mark>There is 1 EI.</mark>

Step 4. Determine the Complexity

FTR Counting Rules	Does the Rule Apply?
Count an FTR for each ILF maintained.	The report control ILF is maintained.
Count an FTR for each ILF or EIF read during the processing of the external input.	The report control ILF is read.
Count only one FTR for each ILF that is both maintained and read.	The report control ILF is maintained and read. It is counted only once.

Conclusion: <mark>The FTR count is 1.</mark>

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters or exits the application boundary and is required to complete the external input.	Sort Sequence, Printer Port, Output Format.
Do <u>not</u> count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	Not applicable.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	User message.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	OK button.

Conclusion: The DET count is 5.

Complexity

1 FTR and 5 DETs.	Complexity is Low

Step 5. Determine the Contribution

Contribution is 1 Low Complexity EI	3 FP

Example: Screen Input

**User
Requirements**

The user requires the ability to

- Add job information online

- Generate an error message and highlight incorrect fields so that the error may be corrected online

- Save job information added

**Example
Screen**
The following Job Data screen is used to add a new job.

```
 Action:_   7=Prior  8=Following  9=Save
                                    Job Data

 Job number:      RD15379305

 Job name:        May Issue - Print Covers

 Pay grade:       JRNY05A


 Line No          Job Description
   01             Print Covers 4-Up, Lacquer Finish.
 _____
 _____
 _____
 _____
 _____
 _____
 _____
 _____
 _____
 _____

 F1=Help  F7=Scroll up  F8=Scroll down  F12=Cancel
```

Enter: returns to calling screen.	F12: returns to calling screen.
F1: shows screen or field level help.	Action 7: shows prior job data, if present.
F7: scrolls up 10 job description lines.	Action 8: shows following job data, if present.
F8: scrolls down 10 job description lines.	

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EI?	Yes. The primary intent is to maintain an ILF.

Step 3. Validate against the EI Counting Rules

The following table shows the summary analysis of the user requirements using the EI data counting rules for the function, add a new job.

EI Counting Rules	Does the Rule Apply?
The data or control information is received from outside the application boundary.	Yes. Job data is received across the boundary.
At least one ILF is maintained if the data entering the boundary is not control information that alters the behavior of the system.	Yes, the Job ILF is maintained.
For the identified process, <u>one</u> of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external inputs for the application.	Yes. The requirement to generate an error log makes the function unique.
• The set of data elements identified is different from the sets identified for other external inputs for the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external inputs in the application.	Not applicable.

Conclusion: Adding a job is 1 EI.

 Refer to the Case Studies to see how the change and delete requirements and associated screens are counted.

Step 4. Determine the Complexity

FTR Counting Rules	Does the Rule Apply?
Count an FTR for each ILF maintained.	The job ILF is read and updated.
Count an FTR for each ILF or EIF read during the processing of the external input.	The job ILF is read.
Count only one FTR for each ILF that is both maintained and read.	The job ILF is maintained and read, but it is counted only once.

Conclusion: The FTR count is 1.

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters or exits the application boundary and is required to complete the external input.	Job number, Job name, Job pay grade, Job description line (Repeated).
Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	Job description line number exists for technical reasons only and should not be counted as a DET.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	Error messages.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	Add action.

Conclusion: The total DET count is 6.

Complexity

1 FTR and 6 DETs.	Complexity is Low

Step 5. Determine the Contribution

Contribution is 1 Low Complexity EI	3 FP

Example: Batch with Multiple EIs and Duplicate EIs

User Requirements

The user requires the ability to

- Add and change job information in batch mode.

Note: The focus of this example is adding a job in batch mode. The previous example looked at the online mode. The Case Studies illustrate counting all user requirements for adding jobs in both online and batch modes.
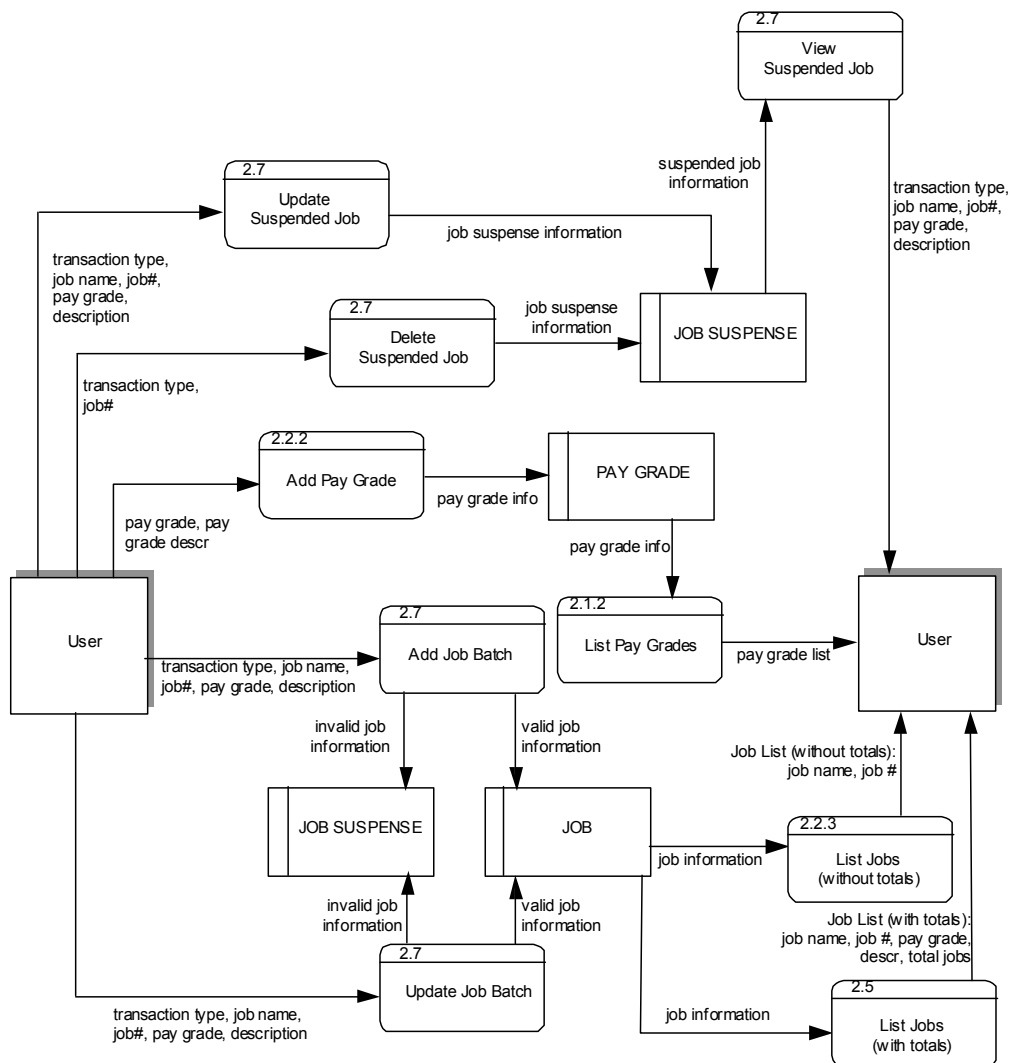
Construction Requirements

It was decided that during the batch process, any jobs not successfully updated would error into a suspense file, which will be separately maintained. (See next example)

Record Layout

The following diagram shows the record layout for this example.

```
            12345678910123456789012345678901234567890123456789012345678901234567890123
4567890
0           1          2          3          4          5          6          7          8
1                      ADD|01|SRENG|SENIOR ENGINEER INFORMATION SYSTEMS|05|
2                      ADD|02|SRENG|01|STARTS AT PAY GRADE 05          |
3                      ADD|02|SRENG|02|OTHER PAY GRADES:06 AND 07      |
4                      CHG|03|STENG|                              |04|
5                      CHG|04|STENG|02|OTHER PAY GRADES:05 AND 06     |
6
7
9
0
1
2
3
4
5
6
7
9
0
1
2
3
4
```

Record Descriptions

The following table includes descriptions for each record type.

Record	Position	Description
01	1-3	Transaction type
	4-5	Record type
	6-10	Job number
	11-45	Job name
	46-47	Job pay grade
02	1-3	Transaction type
	4-5	Record type
	6-10	Job number
	11-12	Description line number
	13-41	Description line

Where Record Types are:

01   Add record for a new job

02   Add record for descriptions of a new job

Step 1. Identify the Elementary Process - Transaction Type 01

Does the Transactional Function meet the requirements of an Elementary Process?	No. A job without a description is not meaningful to the user.

Step 1. Identify the Elementary Process - Transaction Type 02

Does the Transactional Function meet the requirements of an Elementary Process?	No. A description cannot exist without the job it is describing. The data would be inconsistent.

Step 1. Identify the Elementary Process - Transaction Types 1 + 2

Does the Transactional Function meet the requirements of an Elementary Process?	Yes. Job and description are meaningful to the user.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EI?	Yes. The primary intent is to maintain an ILF.

Step 3. Validate against the EI Counting Rules

EI Counting Rules	Does the Rule Apply for combination of "Add Job Record 01 and Add Job Record 02?"
The data or control information is received from outside the application boundary.	Yes.
At least one ILF is maintained if the data entering the boundary is not control information that alters the behavior of the system.	Job, Suspended Job.
For the identified process, <u>one</u> of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external inputs for the application.	Yes. This function is unique from the on-line case, however different validation rules apply, and there is a requirement concerning suspended jobs in the event of a failure.
• The set of data elements identified is different from the sets identified for other external inputs for the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external inputs in the application.	Not applicable.

Conclusion: The combined Transaction Type 01 + 02 is 1 EI.

Step 4. Determine the Complexity

FTR Counting Rules	Does the Rule Apply?
Count an FTR for each ILF maintained.	Job, Suspended Job.
Count an FTR for each ILF or EIF read during the processing of the external input.	Job.
Count only one FTR for each ILF that is both maintained and read.	The job ILF is maintained and read, but it is counted only once.

Conclusion: The FTR count is 2.

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters or exits the application boundary and is required to complete the external input.	Job number, Job name, Job pay grade, Job description line (Repeated). Record Type is physical therefore not counted.
Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	Job description line number exists for technical reasons only and should not be counted as a DET.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	Not applicable. Errors are recorded in a suspense file.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	Transaction type.

Conclusion: The DET count for adding a job is 5.

Complexity

2 FTRs and 5 DETs.	Complexity is Average

Step 5. Determine the Contribution

Contribution is 1 Average Complexity EI	4 FP

Example: <mark>Correcting Suspended Transactions</mark>

User Requirements   <mark>It was decided that during the batch process that any jobs not successfully updated would error into a suspense file. The user requires a screen to access and edit the transactions that are incorrect.</mark>

> **Note:** The focus of this example is only the requirement to correct suspended transactions. The Case Studies illustrate counting the entire user requirement.

Data Flow Diagram   The following diagram shows the data flow for this example.

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EI?	Yes. The primary intent is to maintain an ILF.

Step 3. Validate against the EI Counting Rules

EI Counting Rules	Does the Rule Apply for the Suspense File?
The data or control information is received from outside the application boundary.	Yes. Data for correcting the transaction in error is received across the boundary.
At least one ILF is maintained if the data entering the boundary is not control information that alters the behavior of the system.	Yes. The suspense file is updated.
For the identified process, <u>one</u> of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external inputs for the application.	Yes. No other EI has been identified that performs this function.
• The set of data elements identified is different from the sets identified for other external inputs for the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external inputs in the application.	Not applicable.

Conclusion: <mark>There is 1 EI.</mark>

Step 4. Determine the Complexity

FTR Counting Rules	Does the Rule Apply?
Count an FTR for each ILF maintained.	Job Suspense.
Count an FTR for each ILF or EIF read during the processing of the external input.	Job Suspense.
Count only one FTR for each ILF that is both maintained and read.	Job Suspense is maintained and referenced, but it is counted only once.

Conclusion: <mark>FTR count is 1.</mark>

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters or exits the application boundary and is required to complete the external input.	Transaction type, Job number, Job name, Job pay grade, Job description line (Repeated). The Record Type is physical and is, therefore, not counted. All other fields are user recognizable.
Do <u>not</u> count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	Job description line number exists for technical reasons only and should not be counted as a DET.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	There are no messages.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	Enter key.

Conclusion: The <mark>DET count is 6.</mark> Note that the transaction type is spaced within Job Suspense and may be maintained by the user.

Complexity

1 FTR and 6 DETs.	Complexity is Low

Step 5. Determine the Contribution

Contribution is 1 Low Complexity EI	<mark>3 FP</mark>

Example: EI with Multiple File Types Referenced

User Requirements   The user requires the ability to add job assignments.

Note: The focus of this example is only the requirement to add job assignments. The Case Studies illustrate counting the entire user requirement.

Example Window   The following diagram shows an example of the window to add job assignments.

—	**Human Resources System**	▽	⇕

Employee   Jobs   Assignments   Locations   Reports   Security   Help

—	**Employee Assignments**

| — | **Job Assignment Setup** |

First Name	MI	Last Name
Mark	J	Manship

Social Security Number   345-67-8901

Location   Main Plant   Bargaining Unit   UFPCA

Job Number   [   ]   ↓   [   ]

Date   [   ]   **OK**

Salary   [   ]

Performance Rating   [   ]   **Cancel**

AE-3

OK	**Saves new job assignment, returns to AE-1**

Cancel	**Ignores data entered, returns to AE-1**

Data Flow Diagram   The following diagram shows the data flow for the job assignment process.

Legend:

User or Application

Data Stored

Process

Flow of Data

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EI?	Yes. The primary intent is to maintain an ILF.

Step 3. Validate against the EI Counting Rules

EI Counting Rules	Does the Rule Apply?
The data or control information is received from outside the application boundary.	Yes.
At least one ILF is maintained if the data entering the boundary is not control information that alters the behavior of the system.	Yes. The Job Assignment ILF is maintained.
For the identified process, <u>one</u> of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external inputs for the application.	Yes. No other EI has beeen identified that performs this function.
• The set of data elements identified is different from the sets identified for other external inputs for the application.	Yes.
• The ILFs or EIFs referenced are different from the files referenced by other external inputs in the application.	Yes.

Conclusion: There is 1 EI.

Step 4. Determine the Complexity

FTR Counting Rules	Does the Rule Apply?
Count an FTR for each ILF maintained.	Job Assignment.
Count an FTR for each ILF or EIF read during the processing of the external input.	Job assignment is read.
	The employee ILF is read to ensure that employee exists and to display employee name.
	The job ILF is read to ensure that the job exists and to display job name.
Count only one FTR for each ILF that is both maintained and read.	Job assignment is both maintained and read, but it is counted only once.

Conclusion: The FTR count is 3

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters or exits the application boundary and is required to complete the external input.	Employee Name, Social security number, Location, Bargaining Unit, Job number, Job Name, Effective date, Salary, Performance rating.
Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	There are no fields of this type.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	Error message.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	A command key is required to save the transaction.

Conclusion: The total DET count is 11.

Complexity

3 FTR and 11 DETs.	Complexity is High

Step 5. Determine the Contribution

Contribution is 1 High Complexity EI	6 FP

Example: Data Conversion

User Requirements   The user has purchased a new HR application package. The user requires the ability to migrate existing employee information (Name, Social Security Number, Number of dependents, Type code, Supervisory level, Standard hourly rate, Collective bargaining unit number, and Location name) to the new application.

The old system did not let the user maintain employee dependent's information. The dependent's information can be created after existing employees are migrated to the new application.

Note: Part 1, Chapter 9 explains how this one-time data conversion is included in the project function point counts but excluded from the application counts.

Data Diagrams   The following diagram shows the data for the old and new applications.

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EI?	Yes. The primary intent is to maintain an ILF.

Step 3. Validate against the EI Counting Rules

EI Counting Rules	Does the Rule Apply?
The data or control information is received from outside the application boundary.	Yes. Data from the employee file of the old HR application crosses the boundary.
At least one ILF is maintained if the data entering the boundary is not control information that alters the behavior of the system.	Yes. The employee ILF is maintained.
For the identified process, one of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external inputs for the application.	Yes. No other EI has beeen identified that performs this function using data from this source.
• The set of data elements identified is different from the sets identified for other external inputs for the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external inputs in the application.	Not applicable.

Conclusion: There is 1 EI.

Step 4. Determine the Complexity

FTR Counting Rules	Does the Rule Apply?
Count an FTR for each ILF maintained.	The employee ILF is maintained.
Count an FTR for each ILF or EIF read during the processing of the external input.	The employee ILF is read.
Count only one FTR for each ILF that is both maintained and read.	The employee ILF is maintained and read, but it is counted only once.

Conclusion: The FTR count is 1.

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters or exits the application boundary and is required to complete the external input.	Name, Social Security Number, Number of dependents, Type code, Supervisory level, Standard hourly rate, Collective bargaining unit number, Location name.
Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	There are no fields of this type.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	Not applicable.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	Not applicable.

Conclusion: The <mark>DET count is 8.</mark>

Complexity

1 FTR and 8 DETs.	Complexity is Low

Step 5. Determine the Contribution

Contribution is 1 Low Complexity EI	<mark>3 FP</mark>

Example: Referencing Data from Another Application

User Requirements

The user requires the Human Resources application to provide the following capabilities:

- All hourly employees must be paid in United States dollars.

- When adding or changing employee information, the Human Resources application must access the Currency application to retrieve a conversion rate. After retrieving the conversion rate, the HR application converts the employee's local standard hourly rate to a U.S. hourly rate using the following calculation:

$$\frac{\text{Standard Hourly Rate}}{\text{Conversion Rate}} = \text{U.S. Dollar Hourly Rate}$$

The following diagram shows the relationship for this example.
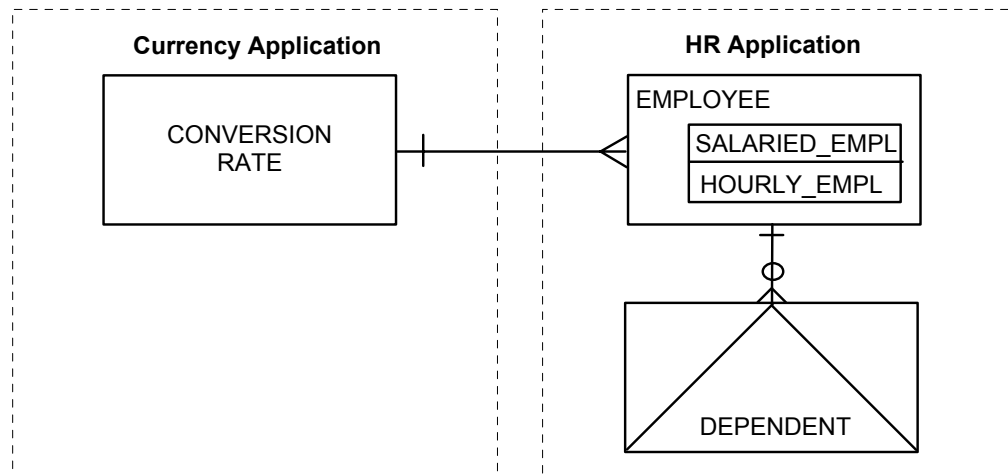
Legend:

☐	Entity Type
◺	Attribute Entity Type
☰	Entity Subtype
┼─<	Mandatory One-to-Many Relationship
┼─o<	Optional One-to-Many Relationship

Conversion   The conversion information includes
Information
                      CURRENCY

- Conversion_Rate_To_Base_Currency

- Country

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	No. Referencing the data is only meaningful when assciated with adding an employee.

Conclusion: There is not an EI for the retrieval of conversion information. Refer to the EIF counting examples in ILF/EIF Counting Examples to see why conversion information may be counted as an EIF.

Example: EI with Screen Output - 1

User Requirements   The user requires the ability to save a sales transaction for a customer. The cost of each item is to be shown, and the transaction total must be displayed for review before the information is saved.

Example Screen   The following sales transaction screen is a simplification to illustrate how output fields are counted. The user enters the customer name and transaction date. As each item and quantity required is entered, the system calculates and displays the costs as shown.

```
                          Sales Transaction

 Customer Name: _____
 Transaction Date: _____


    Item                       Qty   Item Cost           Item Total Cost
    _____ _____ $_____.__          $_____.__
    _____ _____ $_____.__          $_____.__
    _____ _____ $_____.__          $_____.__
    _____ _____ $_____.__          $_____.__
    _____ _____ $_____.__          $_____.__
    _____ _____ $_____.__          $_____.__

                                         Sub Total $_____.__
                                         Sales Tax $_____.__
                                         Total     $_____.__

 F1=Save
```

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EI?	Yes. The primary intent is to maintain an ILF.

Step 3. Validate against the EI Counting Rules

EI Counting Rules	Does the Rule Apply?
The data or control information is received from outside the application boundary.	Yes. Transaction data is received across the boundary.
At least one ILF is maintained if the data entering the boundary is not control information that alters the behavior of the system.	Yes, the sales transaction ILF is maintained.
For the identified process, <u>one</u> of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external inputs for the application.	Yes. No other EI has been identified that performs this function.
• The set of data elements identified is different from the sets identified for other external inputs for the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external inputs in the application.	Not applicable.

Conclusion: There is one EI

Step 4. Determine the Complexity

FTR Counting Rules	Does the Rule Apply?
Count an FTR for each ILF maintained.	The sales transaction ILF is maintained.
Count an FTR for each ILF or EIF read during the processing of the external input.	The sales item ILF is referenced to recover the item cost.
Count only one FTR for each ILF that is both maintained and read.	Not applicable. The sales transaction ILF is maintained and read, but is counted only once.

Conclusion: The FTR count is 2.

DET Counting Rules	Does the Rule Apply?

Count one DET for each user recognizable, non-repeated field that enters or exits the application boundary and is required to complete the external input.	The following input DETs are counted:
	   Customer name
	   Transaction date
	   Item (repeated)
	   Quantity (repeated)
	The following output DETs are counted:
	   Item cost (repeated)
	   Item total cost (repeated)
	   Transaction sub total
	   Sales tax
	   Transaction total total

Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	The output DETs are counted; although they are derived, they do cross the boundary.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	A message is returned in the event of an error.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	Action: The F1 key.

Conclusion: The total DET count is 11.

   Complexity

2 FTRs and 11 DETs.	Complexity is Average

Step 5. Determine the Contribution

Contribution is 1 Average Complexity EI	4 FP

Example: EI with Screen Output - 2

**User
Requirements**

The user requires the ability to assign a job to an employee. In order to select an employee and job, the user requires the ability to reference the employee and job files using 2 drop down lists. The employee list is required to show the employee number and name. The jobs list is required to show the job number and its description. The number of employees assigned to the job is to be displayed after the record is saved. In the event of an error, an appropriate message is displayed.

**Example
Screen**

The following Job Assignment screen is a simplification to illustrate how output fields are counted. The user selects the employee from a drop down list showing the employee name and employee number. On selection, the system needs the employee number for the assignment. The user selects the job from a dropdown list showing the job number and its description. The system needs the job number for the assignment. When the assignment is saved, the system determines the number of employees and displays it to the user.

Human Resources System	▽ ⇕

Employees   Jobs   Assignments   Locations   Help

|Job Assignment|

Employee Number   `1290`   `1290  James, R.W` ▽
Job Number   `0100`   `0100  Apply Lacquer` ▽

Assignment Date   `12/12/1998`

| **Save** |

Total Number of Employees assigned to this Job   `3`

It is clear that the inquiry on jobs and employees are two separate elementary processes (EQs); They are not analyzed here.

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EI?	Yes. The primary intent is to maintain an ILF.

Step 3. Validate against the EI Counting Rules

EI Counting Rules	Does the Rule Apply?
The data or control information is received from outside the application boundary.	Yes.
At least one ILF is maintained if the data entering the boundary is not control information that alters the behavior of the system.	Yes, the job assignment ILF is maintained.
For the identified process, <u>one</u> of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external inputs for the application.	Yes. No other EI has been identified that performs this function.
• The set of data elements identified is different from the sets identified for other external inputs for the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external inputs in the application.	Not applicable.

Conclusion: Creating a Job Assignment is 1 EI.

Step 4. Determine the Complexity

FTR Counting Rules	Does the Rule Apply?
Count an FTR for each ILF maintained.	The job assignment ILF is maintained.
Count an FTR for each ILF or EIF read during the processing of the external input.	The job assignment ILF is read.
Count only one FTR for each ILF that is both maintained and read.	The job assignment ILF is maintained and read, but it is counted only once.

Conclusion: The <mark>FTR Count is 1</mark>.

DET Counting Rules	Does the Rule Apply?

Count one DET for each user recognizable, non-repeated field that enters or exits the application boundary and is required to complete the external input.	The following input DETs are counted:
	  Employee number
	  Job number
	  Assignment date
	
	The following output DETs are counted:
	  Employees assigned to a job
	
	The Employee name and Job name DETs in the dropdowns are not counted as DETs, as they are part of separate EQs.

Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	The output DET is counted, although it is derived, it does cross the boundary.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	A message is returned in the event of an error.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	There is only one way the function can be invoked, via the Save key.

Conclusion: The <mark>DET count is 6</mark>.

Complexity

1 FTR and 6 DETs.	Complexity is Low

Step 5. Determine the Contribution

Contribution is 1 Low Complexity EI	3 FP

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EO Counting Examples

Introduction   This section uses a Human Resources (HR) application to illustrate
procedures used to count external outputs. In addition to this section,
examples are in the Case Studies included as complementary IFPUG
documentation.

Contents   This section includes following examples:

Summary Descriptions of EO Counting Examples

The examples for EOs are described in the following table.

Example	Summary Description	Page
Hard Copy Report Output	This example looks at counting a hard copy report.	2-61
Online Reporting	This example shows the count for an online report.	2-65
Transaction Sent to Another Application	This example illustrates a transaction generated by one application and sent to another application.	2-69
Error/Confirmation Message	This example shows why error or confirmation messages are not counted as an external output.	2-72
Notification Message	This example illustrates how notification messages are counted.	2-73
EO Triggered without Data Crossing the Boundary	This example illustrates the concept that an EO can be triggered without data crossing the boundary.	2-77
Primary Function of an EO	This example illustrates that an EO can update a file.	2-81
EO Transaction File	This example illustrates the existence of calculations determines that the elementary process is an EO and not an EQ.	2-85

Example: Hard Copy Report Output

User Requirements

The user of the Human Resources System requires a listing of employee job assignments.

The report is generated by retrieving:

- An assignment from the job assignment ILF
- Additional information from the employee and job ILFs.

The report control ILF is referenced to determine how to generate the report.

Example Report

The following Job with Employees Report lists jobs and the employees assigned to them.

```
HRS006                        Human Resource System                     Page 1
                              Jobs with Employees                  Date 99.99.99


     Job Number   Job Name                  Employee SSN   Employee Name
       9999       XXXXXXXXXX                 XXX-XX-XXXX    XXXXXXXXXXXXXXX
                                             XXX-XX-XXXX    XXXXXXXXXXXXXXX
                                             XXX-XX-XXXX    XXXXXXXXXXXXXXX


       9999       XXXXXXXXXX                 XXX-XX-XXXX    XXXXXXXXXXXXXXX

       9999       XXXXXXXXXX                 XXX-XX-XXXX    XXXXXXXXXXXXXXX
                                             XXX-XX-XXXX    XXXXXXXXXXXXXXX


               Total Jobs 9999
```

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EO?	Yes. The report contains a calculated field.

Step 3. Validate against the EO Counting Rules

EO Counting Rules	Does the Rule Apply?
The function sends data or control information external to the application boundary.	Yes. The report data crosses the boundary.
For the identified process, <u>one</u> of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external outputs or external inquiries for the application.	Yes. No other EO has been identified that performs this function.
• The set of data elements identified is different from the sets identified for other external outputs and external inquiries in the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external outputs and external inquiries in the application.	Not applicable.
For the identified process, <u>one</u> of the following three statements must apply:	
• The processing logic of the elementary process contains at least one mathematical formula or calculation.	The total number of jobs is a calculated field.
• The processing logic of the elementary process maintains at least one ILF.	Not applicable.
• The processing logic of the elementary process creates derived data.	Not applicable.

Conclusion: There is 1 EO for the Jobs with Employees Report.

Step 4. Determine the Complexity

FTR Counting Rule	Does the Rule Apply?

Count one FTR for each ILF or EIF read during the processing of the elementary process.	Yes. The following ILFs are read:
	  Employee
	  Job
	  Job assignment
	  Report control.

Count one FTR for each ILF maintained during the processing of the elementary process.	No ILFs are maintained.
Count only one FTR for each ILF that is both maintained and read during the elementary process.	Not applicable.

Conclusion: The **FTR count is 4.**

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters the application boundary and is required to specify when, what and/or how the data is to be retrieved or generated by the elementary process.	All fields are user recognizable.
Count one DET for each user recognizable, non-repeated field that exits the boundary.	Total jobs, Job number, Job name, Employee SSN, Employee name are reported. Count each only once.
If a DET both enters and exits the boundary, count it only once for the elementary process.	Not applicable.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	Not applicable.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	Not applicable.
Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	Not applicable.
Do not count literals as DETs.	
Do not count paging variables or system-generated stamps.	

Conclusion: The **DET count is 5.**

Complexity

4 FTRs and 5 DETs	Complexity is Average

Step 5. Determine the Contribution

Contribution is 1 Average Complexity EO	5 FP

Example: Online Reporting

User Requirements   The user requires a report of employees in descending sequence by the duration of their current job assignments. This report is displayed online and contains derived data (for example, the job assignment duration).

Example Screen   The following Employees by Assignment Duration screen layout lists employees by duration.

.

```
                    EMPLOYEES BY ASSIGNMENT DURATION


  Rows 1 to 18 of 1,316                                      MM/DD/YY

  Employee           Employee          Job          Job          Assignment
   SSN                Name             Number        Name          Duration

  XXX-XX-XXXX        XXXXXXXXXX         9999        XXXXXXXXXX     99 mos.
  XXX-XX-XXXX        XXXXXXXXXX         9999        XXXXXXXXXX     99 mos.

                     Employees over 24 mos. 9999

                     Employees over 12 mos. 9999




  F1=Help F7=Scroll up F8=Scroll down F16=End
```

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EO?	Yes. The report contains calculated data.

Step 3. Validate against the EO Counting Rules

EO Counting Rules	Does the Rule Apply?
The function sends data or control information external to the application boundary.	Yes. Employee data leaves the boundary.
For the identified process, <u>one</u> of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external outputs or external inquiries for the application.	Yes. No other EO has been identified that performs this function.
• The set of data elements identified is different from the sets identified for other external outputs and external inquiries in the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external outputs and external inquiries in the application.	Not applicable.
For the identified process, <u>one</u> of the following three statements must apply:	
• The processing logic of the elementary process contains at least one mathematical formula or calculation.	Yes
• The processing logic of the elementary process maintains at least one ILF.	Not applicable.
• The processing logic of the elementary process creates derived data.	Yes.

Conclusion: There is <mark>1 EO for</mark> the Employee By Assignment Duration Report.

Step 4. Determine the Complexity

FTR Counting Rule	Does the Rule Apply?
Count one FTR for each ILF or EIF read during the processing of the elementary process.	The Employee, Job and Job assignment ILFs are read.
Count one FTR for each ILF maintained during the processing of the elementary process.	No ILFs are maintained.
Count only one FTR for each ILF that is both maintained and read during the elementary process.	Not applicable.

Conclusion: The FTR count is 3.

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters the application boundary and is required to specify when, what and/or how the data is to be retrieved or generated by the elementary process.	Not applicable.
Count one DET for each user recognizable, non-repeated field that exits the boundary.	Totals of employees over 24 mos. and 12 mos., Employee SSN, Employee name, Job number, Job name, and Assignment duration are repeated. Count each only once.
If a DET both enters and exits the boundary, count it only once for the elementary process.	Not applicable.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	Not applicable.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	A function key is used to display the online report.
Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	Not applicable.
Do not count literals as DETs.	
Do not count paging variables or system-generated stamps.	

Conclusion: The DET count is 8.

Complexity

3 FTRs and 8 DETs.	Complexity is Average

Step 5. Determine the Contribution

Contribution is 1 Average Complexity EO	5 FP

Example: <mark>Transaction Sent to Another Application</mark>

User Requirements   When the Human Resources System adds employee dependent data, the user requires that this information is sent to the Benefits application to keep benefits records consistent. This information is sent to Benefits daily.

Construction Requirements   If dependent data is added, that information is formatted properly on the output transaction file.

When implementing a solution, it was decided to include a header and trailer record with the benefits information. These records are used by Benefits to ensure that nothing technically was incorrect when transmitting the file.

Example Record Layout   The following employee dependent record layout contains information about dependent additions and changes.

```
  12345678910123456789012345678901234567890123456789012345678901234567890
0               1         2         3         4         5         6         7         8
1 H|FILE NAME |DATE   |
2 D|EMP SSN  |DEP SSN  |DEPENDENT NAME     |DEPBDAY|
3 T|TOTAL REC|
4
5
6
7
9
0
1
2
3
4
5
6
7
9
0
1
2
3
4
```

Field Descriptions   The following table includes descriptions for each field on the record.

Record Type	Position	Description
Header	1	Record type H
	2-13	File name
	14-19	Date created
Dependent	1	Record type D
	2-10	Employee social security number
	11-19	Dependent social security number
	20-39	Dependent name
	40-45	Dependent birth date
Trailer	1	Record type T
	2-10	Total number of records

Step 1. Identify the Elementary Process - Header

Does the Transactional Function meet the requirements of an Elementary Process?	No. The header contains no user meaningful data.

Step 1. Identify the Elementary Process - Trailer

Does the Transactional Function meet the requirements of an Elementary Process?	No. The trailer contains no user meaningful data.

Step 1. Identify the Elementary Process - Dependent

Does the Transactional Function meet the requirements of an Elementary Process?	Yes. The dependent section of the transaction file satisfies the requirement for an EP.

Step 2. Determine the Primary Intent, and Classify - Dependent

Does the Transactional Function satisfy the Primary Intent of an EO?	Unsure, must review EO rules.

Step 3. Validate against the EO Counting Rules to the dependent section

EO Counting Rules	Does the Rule Apply?
The function sends data or control information external to the application boundary.	Yes. The output transaction file contains the data being transfered to the Benefits application.
For the identified process, <u>one</u> of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external outputs or external inquiries for the application.	Yes. No other EO has been identified that performs this function.
• The set of data elements identified is different from the sets identified for other external outputs and external inquiries in the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external outputs and external inquiries in the application.	Not applicable.
For the identified process, <u>one</u> of the following three statements must apply:	
• The processing logic of the elementary process contains at least one mathematical formula or calculation.	No.
• The processing logic of the elementary process maintains at least one ILF.	No.
• The processing logic of the elementary process creates derived data.	No.

Conclusion: This function does not qualify as an EO; it would be counted as an EQ (not analyzed here).

Example: <mark>Error/Confirmation Messages</mark>

User Requirements   Users require message feedback when job information is maintained. More specifically, users require messages to indicate any edit or validation errors or to indicate that the process completed successfully.

Example Screen   The following Job screen shows a confirmation message (bottom of screen).

```
 Action:_   7=Prior  8=Following
                                Job Data

 Job number:       RD15379305

 Job name:         May Issue - Print Covers

 Pay grade:        JRNY05A


 Line No           Job Description
   01              Print Covers 4-Up, Lacquer Finish.
 _____
 _____
 _____
 _____
 _____
 _____
 _____
 _____
 _____
 _____


 F1=Help  F7=Scroll up  F8=Scroll down  F12=Cancel
 Processing Completed Successfully
```

Enter: returns to calling screen.   F12:   returns to calling screen.
F1:   shows screen or field level help.   Action 7: shows prior job data, if present.
F7:   scrolls up 10 job description lines.   Action 8: shows following job data, if present.
F8:   scrolls down 10 job description lines.

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	No. <mark>The output of an error message is not an EP. It is a DET on the EI.</mark>

No further analysis is required.

Example: Notification Message

User Requirements   The user requires automatic notification when an employee has completed 12 months in a job assignment. This indicates that a performance review should be completed.

Example Window   The following Performance Review Notification window describes the notification message.

Performance Review Notification

Date: xx/xx/xx   Time: hh.mm

Employee: xxx-xx-xxxx   x_____x

Has completed 12 months in assignment:

Job: xxxx   x_____x

And should be scheduled for a performance review immediately.

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EO?	Yes. The 12 Month completion date is calculated.

Step 3. Validate against the EO Counting Rules

EO Counting Rules	Does the Rule Apply?
The function sends data or control information external to the application boundary.	Yes. The notification data cross the boundary.
For the identified process, <u>one</u> of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external outputs or external inquiries for the application.	Yes. No other EO performs this function.
• The set of data elements identified is different from the sets identified for other external outputs and external inquiries in the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external outputs and external inquiries in the application.	Not applicable.
For the identified process, <u>one</u> of the following three statements must apply:	
• The processing logic of the elementary process contains at least one mathematical formula or calculation.	12 month completion date is calculated.
• The processing logic of the elementary process maintains at least one ILF.	Not applicable.
• The processing logic of the elementary process creates derived data.	Not applicable.

Conclusion: The notification message is an EO.

Step 4. Determine the Complexity

FTR Counting Rule	Does the Rule Apply?
Count one FTR for each ILF or EIF read during the processing of the elementary process.	Employee, Job, Job assignment.
Count one FTR for each ILF maintained during the processing of the elementary process.	Not applicable.
Count only one FTR for each ILF that is both maintained and read during the elementary process.	Not applicable.

Conclusion: The FTR count is 3.

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters the application boundary and is required to specify when, what and/or how the data is to be retrieved or generated by the elementary process.	Not applicable.
Count one DET for each user recognizable, non-repeated field that exits the boundary.	Employee social security number, Employee name, Job number, Job name.
If a DET both enters and exits the boundary, count it only once for the elementary process.	Not applicable.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	Not applicable.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	Not applicable.
Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	
Do not count literals as DETs.	
Do not count paging variables or system-generated stamps.	

Conclusion: The DET count is 4.

Complexity

3 FTR and 4 DETs.	Complexity is Low

Step 5. Determine the Contribution

Contribution is 1 Low Complexity EO	4 FP

Example: <mark>EO Triggered without Data Crossing the Boundary</mark>

User Requirement: Users require that the application print the Weekly Employee Report automatically every Sunday night at 11:00 p.m. The report contains details for each employee plus a total of the employees.

Data Model   The following diagram shows the data flow for this example.

Print Weekly Employee Report

Employee ILF
SSN
Name
Location

Weekly Employee Report

Name	Location
Brown, B.	Macomb
D'Souza. M.	New Plymouth
Garmus, D.	Orange Park
Fischer, J.	Palm Coast
Marthaler, V.	Clarkston
Thompson, K.	Atlanta
Timp, A.	Maarssen
Van Vliet, E.	Maarssen

Total Employees: 8

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EO?	Yes. The report contains a calculated field.

Step 3. Validate against the EO Counting Rules

EO Counting Rules	Does the Rule Apply?
The function sends data or control information external to the application boundary.	Yes. The report data crosses the boundary.
For the identified process, <u>one</u> of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external outputs or external inquiries for the application.	Yes. No other EO performs this function.
• The set of data elements identified is different from the sets identified for other external outputs and external inquiries in the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external outputs and external inquiries in the application.	Not applicable.
For the identified process, <u>one</u> of the following three statements must apply:	
• The processing logic of the elementary process contains at least one mathematical formula or calculation.	Yes. Total employees is calculated.
• The processing logic of the elementary process maintains at least one ILF.	Not applicable.
• The processing logic of the elementary process creates derived data.	Not applicable.

Conclusion: The weekly employee report is an EO.

Step 4. Determine the Complexity

FTR Counting Rule	Does the Rule Apply?
Count one FTR for each ILF or EIF read during the processing of the elementary process.	Employee.
Count one FTR for each ILF maintained during the processing of the elementary process.	No ILF is maintained.
Count only one FTR for each ILF that is both maintained and read during the elementary process.	Not applicable.

Conclusion: The FTR count is 1.

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters the application boundary and is required to specify when, what and/or how the data is to be retrieved or generated by the elementary process.	Not applicable.
Count one DET for each user recognizable, non-repeated field that exits the boundary.	Name, Location,Total Employees.
If a DET both enters and exits the boundary, count it only once for the elementary process.	Not applicable.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	Not applicable.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	Not applicable.
Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	Not applicable.
Do not count literals as DETs.	
Do not count paging variables or system-generated stamps.	

Conclusion: The DET count is 3.

Complexity

1 FTR and 3 DETs.	Complexity is Low

Step 5. Determine the Contribution

Contribution is 1 Low Complexity EO	4 FP

Example: Primary Function of an EO

User Requirements   Print a check and, as a result, mark the account as paid. All data printed on the check was already stored in the check file.

The following diagram shows the data flow for this example.

Print check

BOB JONES   2048

DATE _____

PAY TO THE ORDER OF _____ $[   ]

_____ DOLLARS

FIRST NATIONAL BANK

⑈ OO 2100 66⑆ ⑆7OⅢ 9640 76Ⅲ 2121

Check ILF
Check Number
Check Amount
Recipient
Account Paid Indicator

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EO?	Yes. The primary intent is to print a check. The maintenance of the ILF is secondary.

Step 3. Validate against the EO Counting Rules

EO Counting Rules	Does the Rule Apply?
The function sends data or control information external to the application boundary.	Yes. The check information crosses the boundary.
For the identified process, <u>one</u> of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external outputs or external inquiries for the application.	Yes. No other EO performs this function.
• The set of data elements identified is different from the sets identified for other external outputs and external inquiries in the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external outputs and external inquiries in the application.	Not applicable.
For the identified process, <u>one</u> of the following three statements must apply:	
• The processing logic of the elementary process contains at least one mathematical formula or calculation.	Not applicable.
• The processing logic of the elementary process maintains at least one ILF.	Yes. The check ILF is updated.
• The processing logic of the elementary process creates derived data.	Not applicable.

Conclusion: There is 1 EO.

Step 4. Determine the Complexity

FTR Counting Rule	Does the Rule Apply?
Count one FTR for each ILF or EIF read during the processing of the elementary process.	The check ILF is read.
Count one FTR for each ILF maintained during the processing of the elementary process.	The check file is maintained.
Count only one FTR for each ILF that is both maintained and read during the elementary process.	The check ILF is read and maintained, count only once.

Conclusion: FTR count is 1.

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters the application boundary and is required to specify when, what and/or how the data is to be retrieved or generated by the elementary process.	Not applicable.
Count one DET for each user recognizable, non-repeated field that exits the boundary.	Check number, Check amount, Recipient. The Account paid indicator is not counted as it does not cross the boundary. The date is neither stored or printed.
If a DET both enters and exits the boundary, count it only once for the elementary process.	Not applicable.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	Not applicable.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	Not applicable.
Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	Not applicable.
Do not count literals as DETs.	
Do not count paging variables or system-generated stamps.	

Conclusion: The DET count is 3.

Complexity

1 FTR and 3 DETs.	Complexity is Low

Step 5. Determine the Contribution

Contribution is 1 Low Complexity EO	4 FP

Example: EO Transaction File

User Requirements At the end of the month, generate a transaction file and send it to Application B. The check numbers and amounts are included on the file with a computed count of the checks processed and the total amount of all of the checks printed for the month.

Data Model The following diagram shows the data flow for this example.

Application A   Application B

Generate
Monthly Check
File

Monthly Check File

Check number
Check Amount

**No. of Checks Printed
Total $ for all checks**

Check ILF
Check Number
Check Amount
...

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EO?	Yes. The primary intent is to generate a transaction file. It includes calculated fields.

Step 3. Validate against the EO Counting Rules

EO Counting Rules	Does the Rule Apply?
The function sends data or control information external to the application boundary.	Yes. Transaction data exits the application.
For the identified process, <u>one</u> of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external outputs or external inquiries for the application.	Yes. No other EO performs this function.
• The set of data elements identified is different from the sets identified for other external outputs and external inquiries in the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external outputs and external inquiries in the application.	Not applicable.
For the identified process, <u>one</u> of the following three statements must apply:	
• The processing logic of the elementary process contains at least one mathematical formula or calculation.	Yes. The number of checks and the total value are calculated.
• The processing logic of the elementary process maintains at least one ILF.	Not applicable.
• The processing logic of the elementary process creates derived data.	Not applicable.

Conclusion: There is 1 EO.

Step 4. Determine the Complexity

FTR Counting Rule	Does the Rule Apply?
Count one FTR for each ILF or EIF read during the processing of the elementary process.	The Check ILF is read.
Count one FTR for each ILF maintained during the processing of the elementary process.	Not applicable.
Count only one FTR for each ILF that is both maintained and read during the elementary process.	Not applicable.

Conclusion: The FTR count is 1.

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters the application boundary and is required to specify when, what and/or how the data is to be retrieved or generated by the elementary process.	Not applicable.
Count one DET for each user recognizable, non-repeated field that exits the boundary.	Check number, Amount, No. of checks printed, Total $ for all checks.
If a DET both enters and exits the boundary, count it only once for the elementary process.	Not applicable.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	Not applicable.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	Not applicable.
Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	
Do not count literals as DETs.	
Do not count paging variables or system-generated stamps.	

Conclusion: The DET count is 4.

Complexity

1 FTR and 4 DETs.	Complexity is Low

Step 5. Determine the Contribution

Contribution is 1 Low Complexity EO	<mark>4 FP</mark>

EQ Counting Examples

Introduction   This section uses a Human Resources (HR) application to illustrate
procedures to count external inquiries. In addition to this section, examples
are in the Case Studies included in the complementary IFPUG documentation.

Contents   This section includes the following examples:

Summary Descriptions of EQ Counting Examples

The examples for EQs are listed and described in the following table.

Example	Summary Description	Page
Application Menus	This example shows why navigational menus or other navigational aids are not counted as EQs.	2-91
List of Retrieved Data	This example illustrates the count for a list.	2-93
Drop-Down List Box	This example shows how a drop-down list box might be counted.	2-98
Field Level Help–First Occurrence	This example illustrates how field level help is counted for the first occurrence.	2-102
Field Level Help–Second Occurrence	Counting a second instance of field level help is shown in this example.	2-106
Implied Inquiry	This example shows the function point count when data retrieval is not explicitly stated but it is implied.	2-109
EQ Triggered without Data Crossing the Boundary	This example illustrates the count for data retrieval and display triggered internally by time.	2-112
Transaction Sent to Another Application	This example illustrates the count of data sent to another application via a file.	2-115

Example: Application Menus

**User
Requirements**   The Human Resources application requires navigation menus and aids.

**Counting
Process**   The following diagram shows the Employee drop-down menu on the Human
Resources System main menu. This is the input request.

—	**Human Resources System**	▽	⇕
Employee Jobs Assignments Locations Rpt Man Security Help			
New			
Review			
Edit			
Report			
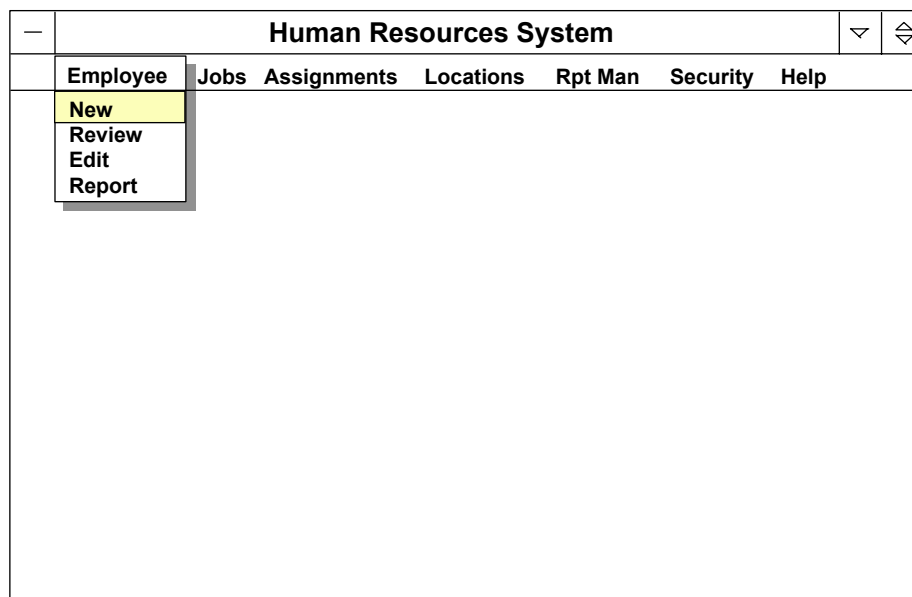
When the user selects New on the Employee drop-down menu, the following empty Employee Setup window is displayed.

−	**Human Resources System**	▽	⇕

Employee   Jobs   Assignments   Locations   Rpt Man   Security   Help

Employee Setup

Last Name

First Name

Middle Initial

Social Security Number ___ ___

Number of Dependents

Location ↴

Currency Location ↴

┌─**Salary Type**─
( ) Hourly
( ) Salaried

OK

Cancel

EN-1

Cancel   **Goes back to pull down menu**

OK   **Navigates to next screen:**
  • **EN-2H, if hourly salary type is selected**
  • **EN-2S, if salaried salary type is selected**

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	No. Selection from a menu of options does not include any data meaningful to the user.

Conclusion: There is no elementary process.

Example: List of Retrieved Data

User   The user has the following requirements:
Requirements
- View a list of employees.

This example focuses on viewing a list of employees in the Human Resources application.

The following diagram shows the data flow for this example.
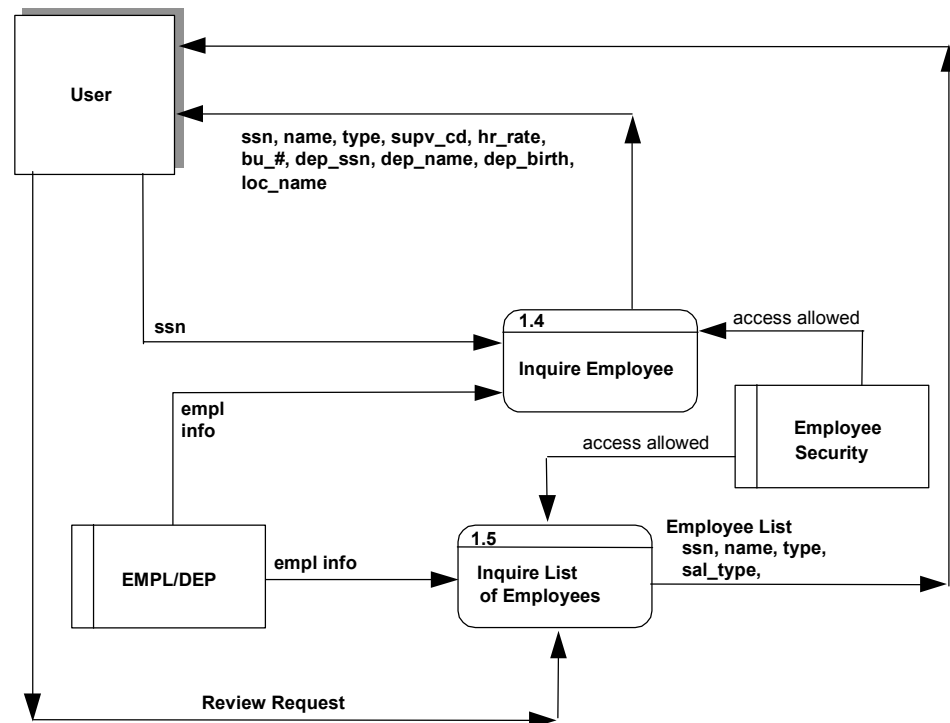
Counting Process

The following diagram shows the drop-down menu for employee. The Review field and the enter key make up the input side of this example.

—	**Human Resources System**	▽	⇕

Employee   Jobs   Assignments   Locations   Rpt Man   Security   Help

New
Review
Edit
Report

When the user selects Review on the Employee drop-down menu, the following window displays with a list of employees.

—	**Human Resources System**	▽	⇕

Employee   Jobs   Assignments   Locations   Rpt Man   Security   Help

—	**Employee List**

Last Name	First Name	MI	Social Security	Salary Type	
Keller	Caroline		123-45-6789	Salaried	↑
Latta	Nicky	A	234-56-7890	Hourly	
Manship	Mark	J	345-67-8901	Hourly	
Schmidt-Taylor	Kathleen		456-78-9012	Salaried	
Smith	David	E	567-89-0123	Hourly	
Smith	Loretta	M	678-90-1234	Salaried	↓

View	**Dependents**	**Cancel**

EI-1

View	Initiates display of data on EI-2
Dependents	Initiates list displayed on EI-4
Cancel	Returns to pull down menu

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EQ?	Yes. The primary intent is to present data. Only retrieved data is involved.

Step 3. Validate against the EQ Counting Rules

EQ Counting Rules	Does the Rule Apply?
The function sends data or control information external to the application boundary.	Yes. The employee data crosses the boundary.
For the identified process, one of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external outputs or external inquiries for the application.	Yes. No other EQ performs this function.
• The set of data elements identified is different from the sets identified for other external outputs and external inquiries in the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external outputs and external inquiries in the application.	Not applicable.
The processing logic of the elementary process retrieves data or control information from an ILF or EIF.	Yes. Employee data is retrieved.
The processing logic of the elementary process does not maintain an ILF.	Yes.
The processing logic of the elementary process does not contain a mathematical formula or calculation.	Yes.
The processing logic of the elementary process does not create derived data.	Yes.

Conclusion: 1 EQ is counted.

Step 4. Determine the Complexity

FTR Counting Rule	Does the Rule Apply?
Count one FTR for each ILF or EIF read during the processing of the elementary process.	Yes. Employee.

Conclusion: The FTR count is 1.

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters the application boundary and is required to specify when, what and/or how the data is to be retrieved or generated by the elementary process.	Not applicable.
Count one DET for each user recognizable, non-repeated field that exits the boundary.	The following are repeated, they are counted only once. (Last Name + First Name + MI), SSN, Salary type.
If a DET both enters and exits the boundary, count it only once for the elementary process.	Not applicable.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	Not applicable.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	Yes, the review field/enter key.
Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	Not applicable.
Do not count literals as DETs.	
Do not count paging variables or system-generated stamps.	

Conclusion: The DET count is 4. The name is considered together as one DET.

Complexity

1 FTR and 4 DETs.	Complexity is Low

Step 5. Determine the Contribution

Contribution is 1 Low Complexity EQ	3 FP

Example: Drop-Down List Box

User   The user requires the ability to view a list of bargaining units added to the
Requirements   Human Resources System by a user.

Counting   The following diagram shows the Hourly Employee Data window with the
Process   Bargaining Unit field.

—	**Human Resources System** ▽ ⇔

Employee   Jobs   Assignments   Locations   Rpt Man   Security   Help

—	**Employee List**

—	**Employee Data**

Mark		J		Manship

345-67-8901

—	**Hourly Employee Data**

Hourly Rate

Bargaining Unit   ↓   **Dependents**

EI-3H

Dependents   **Presents list on EI-4**

When the user selects the arrow, the following drop-down list box appears.

Human Resources System	▽	⇔

Employee   Jobs   Assignments   Locations   Rpt Man   Security   Help

Employee List

Employee Data

Mark   J   Manship

345-67-8901

Hourly Employee Data

Hourly Rate

Bargaining Unit [   ] ↓   **Dependents**

UPFCA
L841
CPLG

EI-3H

Dependents   Presents list on EI-4

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EQ?	Yes. The primary intent is to present information. Only retrieved data is involved.

Step 3. Validate against the EQ Counting Rules

EQ Counting Rules	Does the Rule Apply?
The function sends data or control information external to the application boundary.	Yes. The list of bargaining units is displayed.
For the identified process, one of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external outputs or external inquiries for the application.	Yes. There is no other EQ that performs this function.
• The set of data elements identified is different from the sets identified for other external outputs and external inquiries in the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external outputs and external inquiries in the application.	Not applicable.
The processing logic of the elementary process retrieves data or control information from an ILF or EIF.	Yes. The Bargaining Unit logical file contains numerous fields related to the Bargaining Unit.
The processing logic of the elementary process does not maintain an ILF.	Yes.
The processing logic of the elementary process does not contain a mathematical formula or calculation.	Yes.
The processing logic of the elementary process does not create derived data.	Yes.

Conclusion: There is 1 EQ.

Step 4. Determine the Complexity

FTR Counting Rule	Does the Rule Apply?
Count one FTR for each ILF or EIF read during the processing of the elementary process.	Bargaining unit.

Conclusion: The FTR count is 1.

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters the application boundary and is required to specify when, what and/or how the data is to be retrieved or generated by the elementary process.	Not applicable.
Count one DET for each user recognizable, non-repeated field that exits the boundary.	Bargaining Unit.
If a DET both enters and exits the boundary, count it only once for the elementary process.	Not applicable.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	Not applicable.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	Yes, the down arrow.
Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	Not applicable.
Do not count literals as DETs.	
Do not count paging variables or system-generated stamps.	

Conclusion: The total DET count is 2.

Complexity

1 FTR and 2 DETs.	Complexity is Low

Step 5. Determine the Contribution

Contribution is 1 Low Complexity EQ	3 FP

Example: <mark>Field Level Help–First Occurrence</mark>

User Requirements   During construction of the Human Resources System, a requirement for online field level help was added. Help information is maintained by a separate application. The Help information is referenced by the Human Resources, Currency, Fixed Assets, and Benefits applications.

Counting Process   The following diagram shows the Employee Data window.

When the user presses **F1** while the cursor is on the hourly rate field, a box displays the help text as shown in the following diagram.

	Human Resources System	▽	⇕

Employee   Jobs   Assignments   Locations   Rpt Man   Security   Help

Hourly Rate

The amount an employee is paid for each hour of work completed.

This information must be provided for each hourly employee.

Valid Values: Any hourly amount is acceptable.
Default Values: This field does not have default values.

Hourly Rate

Bargaining Unit ↓   **Dependents**

EI-3H

Dependents   **Presents list on EI-4**

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EQ?	Yes. The primary intent is to present information. Only retrieved data is involved.

Step 3. Validate against the EQ Counting Rules

EQ Counting Rules	Does the Rule Apply?
The function sends data or control information external to the application boundary.	Yes. Help information crosses the boundary.
For the identified process, one of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external outputs or external inquiries for the application.	Yes. No other EQ performs this function.
• The set of data elements identified is different from the sets identified for other external outputs and external inquiries in the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external outputs and external inquiries in the application.	Not applicable.
The processing logic of the elementary process retrieves data or control information from an ILF or EIF.	Yes.
The processing logic of the elementary process does not maintain an ILF.	Yes.
The processing logic of the elementary process does not contain a mathematical formula or calculation.	Yes.
The processing logic of the elementary process does not create derived data.	Yes.

Conclusion: This is 1 EQ.

Step 4. Determine the Complexity

FTR Counting Rule	Does the Rule Apply?
Count one FTR for each ILF or EIF read during the processing of the elementary process.	Help.

Conclusion: The FTR count is 1.

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters the application boundary and is required to specify when, what and/or how the data is to be retrieved or generated by the elementary process.	Window ID, Field ID.
Count one DET for each user recognizable, non-repeated field that exits the boundary.	Help message, Default value, Valid values.
If a DET both enters and exits the boundary, count it only once for the elementary process.	Not applicable.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	Not applicable.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	Yes. The F1 key.
Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	Not applicable.
Do not count literals as DETs.	
Do not count paging variables or system-generated stamps.	

Conclusion: The DET count is 6.

Complexity

1 FTR and 6 DETs.	Complexity is Low

Step 5. Determine the Contribution

Contribution is 1 Low Complexity EQ	3 FP

Example: Field Level Help–Second Occurrence

User Requirements   During construction of the Human Resources System, a requirement for online field level help was added. The online help is for the add, delete, and change processes for the Human Resources information. Help information is maintained by a separate application. The Help information is referenced by the Human Resources, Currency, Fixed Assets, and Benefits applications.

Counting Process   The following diagram shows the Employee Data window.

Human Resources System	▽	⇔

Employee   Jobs   Assignments   Locations   Rpt Man   Security   Help

—	Employee List

—	Employee Data

Mark	J	Manship

345-67-8901

—	Hourly Employee Data

Hourly Rate [   ]

Bargaining Unit [   ] ↓   **Dependents**

EI-3H

Dependents   **Presents list on EI-4**

The user places the cursor on the field for which help is desired, and presses **F1** to view help about that field.

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

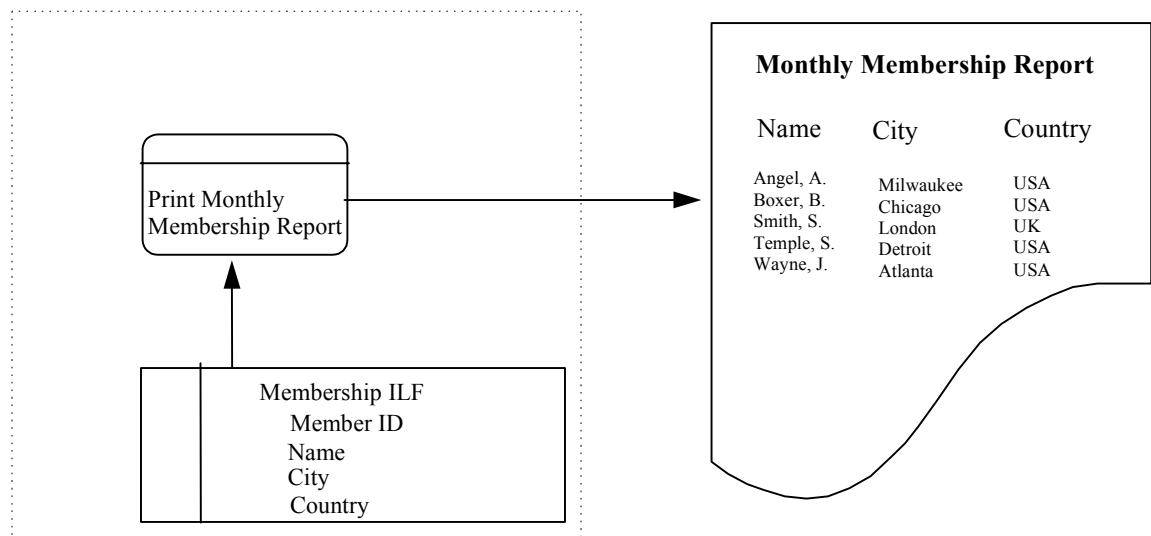|	
Does the Transactional Function satisfy the Primary Intent of an EQ?	Yes. The primary intent is to present information. Only retrieved data is involved.

Step 3. Validate against the EQ Counting Rules

EQ Counting Rules	Does the Rule Apply?
The function sends data or control information external to the application boundary.	Yes. Help information crosses the boundary.
For the identified process, one of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external outputs or external inquiries for the application.	No. The processing logic to present field level help for this field has been identified previously.
• The set of data elements identified is different from the sets identified for other external outputs and external inquiries in the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external outputs and external inquiries in the application.	Not applicable.
The processing logic of the elementary process retrieves data or control information from an ILF or EIF.	Not applicable.
The processing logic of the elementary process does not maintain an ILF.	Not applicable.
The processing logic of the elementary process does not contain a mathematical formula or calculation.	Not applicable.
The processing logic of the elementary process does not create derived data.	Not applicable.

Conclusion: Although this is an Elementary Process, it is not counted because it is not a unique function in this application. Field level help has already been counted.

Example: Implied Inquiry

User   The user requires the ability to view assignment information (i.e., this is a
Requirements direct inquiry). Also, the user requires the ability to edit job assignment
                  information. Although it is not explicitly stated, it is implied that job
                  assignment information must be retrieved before it can be changed.

Counting   The following diagram shows the Job Assignment Edit window with only the
Process   employee name and job number.

	Human Resources System	▽	⇕

Employee   Jobs   Assignments   Locations   Rpt Man   Security   Help

Employee Assignments

Job Assignment Edit

Mark   J   Manship

Job Number   RD15379305   ↓   May Issue - Print Covers

Date   **OK**

                                             Cancel

Salary   **Restore**

Performance Rating   **Delete**

AE-5

OK	Commits changes, returns to AE-1
Cancel	Ignores changes, returns to AE-1
Restore	Restores prior values
Delete	Asks for confirmation, then deletes job assignment

When the user enters employee name and job number, the job information appears as shown in the following diagram.

	Human Resources System		

Employee   Jobs   Assignments   Locations   Rpt Man   Security   Help

Employee Assignments

Job Assignment Edit

Mark		J	Manship

345-67-8901

Main Plant   UFPCA

Job Number   RD15379305   ↓   May Issue - Print Covers

Date   03/27/93   OK

                                                       Cancel

Salary   17.28   Restore

Performance Rating   Satisfactory   Delete

AE-5

OK	Commits changes, returns to AE-1
Cancel	Ignores changes, returns to AE-1
Restore	Restores prior values
Delete	Asks for confirmation, then deletes job assignment

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EQ?	Yes. The primary intent is to present information. Only retrieved data is involved.

Step 3. Validate against the EQ Counting Rules

EQ Counting Rules	Does the Rule Apply?
The function sends data or control information external to the application boundary.	Yes. Job information is displayed.
For the identified process, one of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external outputs or external inquiries for the application.	No. There is an existing direct EQ, which provides a view of the same information and should have been previously counted.
• The set of data elements identified is different from the sets identified for other external outputs and external inquiries in the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external outputs and external inquiries in the application.	Not applicable.
The processing logic of the elementary process retrieves data or control information from an ILF or EIF.	Not applicable.
The processing logic of the elementary process does not maintain an ILF.	Not applicable.
The processing logic of the elementary process does not contain a mathematical formula or calculation.	Not applicable.
The processing logic of the elementary process does not create derived data.	Not applicable.

Conclusion: Although the function is an elementary process, it is not counted because it is not unique within this application. An identical display has previously been counted.

Example: EQ Triggered without Data Crossing the Boundary

User Requirements   The user requires that the application print the Monthly Membership Report automatically every month.

The following diagram shows the data flow for this example.

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EQ?	Yes. The primary intent is to present information. Only retrieved data is involved.

Step 3. Validate against the EQ Counting Rules

EQ Counting Rules	Does the Rule Apply?
The function sends data or control information external to the application boundary.	Yes. The monthly membership data crosses the boundary.
For the identified process, one of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external outputs or external inquiries for the application.	Yes. No other EQ performs this function.
• The set of data elements identified is different from the sets identified for other external outputs and external inquiries in the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external outputs and external inquiries in the application.	Not applicable.
The processing logic of the elementary process retrieves data or control information from an ILF or EIF.	Yes.
The processing logic of the elementary process does not maintain an ILF.	Yes.
The processing logic of the elementary process does not contain a mathematical formula or calculation.	Yes.
The processing logic of the elementary process does not create derived data.	Yes.

Conclusion: There is 1 EQ. Note, an EQ can be triggered without data crossing the boundary. In this example, the transaction is triggered by a time event within the application boundary.

Step 4. Determine the Complexity

FTR Counting Rule	Does the Rule Apply?
Count one FTR for each ILF or EIF read during the processing of the elementary process.	Membership.

Conclusion: The total FTR count is 1.

For DETs, look at each field on the window and determine which DET counting rules apply.

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters the application boundary and is required to specify when, what and/or how the data is to be retrieved or generated by the elementary process.	Not applicable.
Count one DET for each user recognizable, non-repeated field that exits the boundary.	Name, city, country.
If a DET both enters and exits the boundary, count it only once for the elementary process.	Not applicable.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	Not applicable.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	Not applicable.
Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	Not applicable.
Do not count literals as DETs.	
Do not count paging variables or system-generated stamps.	

Conclusion: The DET count is 3.

Complexity

1 FTR and 3 DETs.	Complexity is Low

Step 5. Determine the Contribution

Contribution is 1 Low Complexity EQ	3 FP

Example: Data Sent to Another Application

User Requirements   At the end of each day, send a transaction file to Application B listing the check numbers and the amount of each check printed for the day.

The following diagram shows the data flow for this example.

Application A   Application B

```
        ┌──────────────┐
        │ Generate Daily│────────────→   ( Daily Check File )────→
        │ Check File    │
        └──────────────┘                  Check Number
                ↑                          Check Amount
        ┌──────────────────────┐
        │  Check ILF           │
        │    Check Number      │
        │    Check Amount      │
        │    ...               │
        └──────────────────────┘
```

Step 1. Identify the Elementary Process

Does the Transactional Function meet the requirements of an Elementary Process?	Yes.

Step 2. Determine the Primary Intent, and Classify

Does the Transactional Function satisfy the Primary Intent of an EQ?	Yes. The primary intent is to present information. Only retrieved data is displayed.

Step 3. Validate against the EQ Counting Rules

EQ Counting Rules	Does the Rule Apply?
The function sends data or control information external to the application boundary.	Yes. Data crosses the boundary as a data file of transactions.
For the identified process, one of the following three statements must apply:	
• Processing logic is unique from the processing logic performed by other external outputs or external inquiries for the application.	Yes. No other EQ performs this function.
• The set of data elements identified is different from the sets identified for other external outputs and external inquiries in the application.	Not applicable.
• The ILFs or EIFs referenced are different from the files referenced by other external outputs and external inquiries in the application.	Not applicable.
The processing logic of the elementary process retrieves data or control information from an ILF or EIF.	Yes.
The processing logic of the elementary process does not maintain an ILF.	Yes.
The processing logic of the elementary process does not contain a mathematical formula or calculation.	Yes.
The processing logic of the elementary process does not create derived data.	Yes.

Conclusion: There is 1 EQ.

Step 4. Determine the Complexity

FTR Counting Rule	Does the Rule Apply?
Count one FTR for each ILF or EIF read during the processing of the elementary process.	Check.

Conclusion: The total FTR count is 1.

DET Counting Rules	Does the Rule Apply?
Count one DET for each user recognizable, non-repeated field that enters the application boundary and is required to specify when, what and/or how the data is to be retrieved or generated by the elementary process.	Not applicable.
Count one DET for each user recognizable, non-repeated field that exits the boundary.	Check Number, Amount.
If a DET both enters and exits the boundary, count it only once for the elementary process.	Not applicable.
Count one DET for the capability to send a system response message outside the application boundary to indicate an error occurred during processing, confirm that processing is complete or verify that processing should continue.	Not applicable.
Count one DET for the ability to specify an action to be taken even if there are multiple methods for invoking the same logical process.	Not applicable.
Do not count fields that are retrieved or derived by the system and stored on an ILF during the elementary process if the fields did not cross the application boundary.	Not applicable.
Do not count literals as DETs.	
Do not count paging variables or system-generated stamps.	

Conclusion: The DET count is 2.

Complexity

1 FTR and 2 DETs.	Complexity is Low

Step 5. Determine the Contribution

Contribution is 1 Low Complexity EQ	3 FP

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Index to Part 3