Lessons Learned – Schedule Development using Primavera P6™

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- Years of Experience / Background:
  - 23+ years in construction industry, primary focus on planning, scheduling, project controls, and claims services
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  - Project experience: commercial, residential/custom homes, multi-family/student housing, retail, hospital, medical, hospitality, education, casino, correctional, infrastructure, public works and industrial sectors

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Introduction

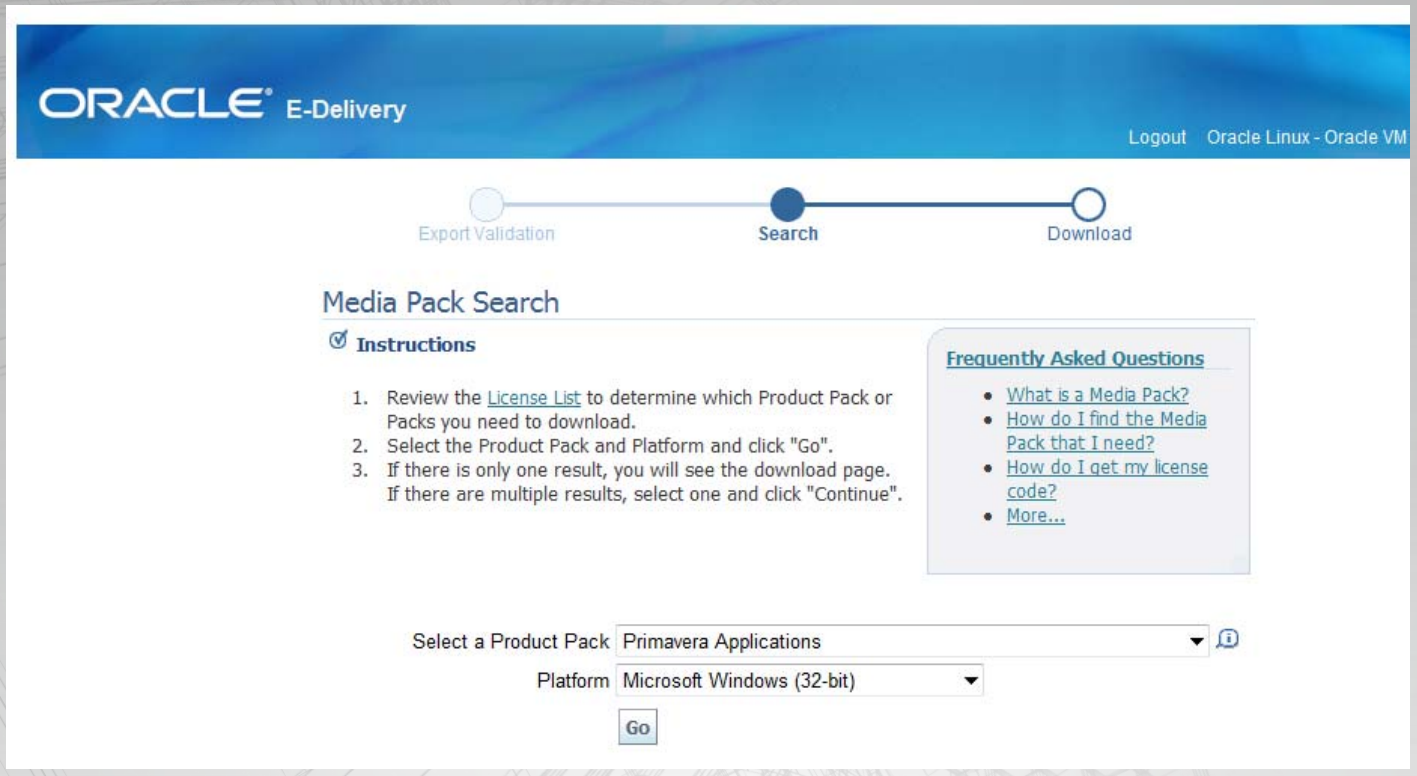
Many specs are requiring the use of the latest Primavera software (P6™)

Our presentation focuses on the use of Primavera P6™ to accomplish the 1st 7 steps for Schedule Planning and Development (from AACE TCM 7.2) for Primavera versions through 8.x (16.x).

1. Plan for Schedule Planning and Development
2. Identify Activities
3. Develop Activity Logic
4. Estimate Durations
5. Establish Schedule Requirements
6. Allocate Resources
7. Optimize Schedule

Application Download & Installation

Oracle E-Delivery website: http://edelivery.oracle.com



Using either database engine Oracle or Microsoft SQL, install the client application and connect the client to the database.

Note: Do not use the sample database as the production environment.

Application Structures

Project Management or P6™ organizes project information based on hierarchical structures. Each structure consists of at least one root or base level and multiple sub or lower levels.

At the highest level the projects are typically organized around an 'Enterprise Project Structure' (EPS) or grouping of the database of projects. Groups might include type, clients, phasing, etc. Projects are organized by common attributes based on the organizational requirements.

Data within P6 is either 'global' or general to the database of projects or to the individual user accessing multiple projects OR is 'project' specific meaning it is associated to a single project within the database.

Plan for Schedule Planning & Development

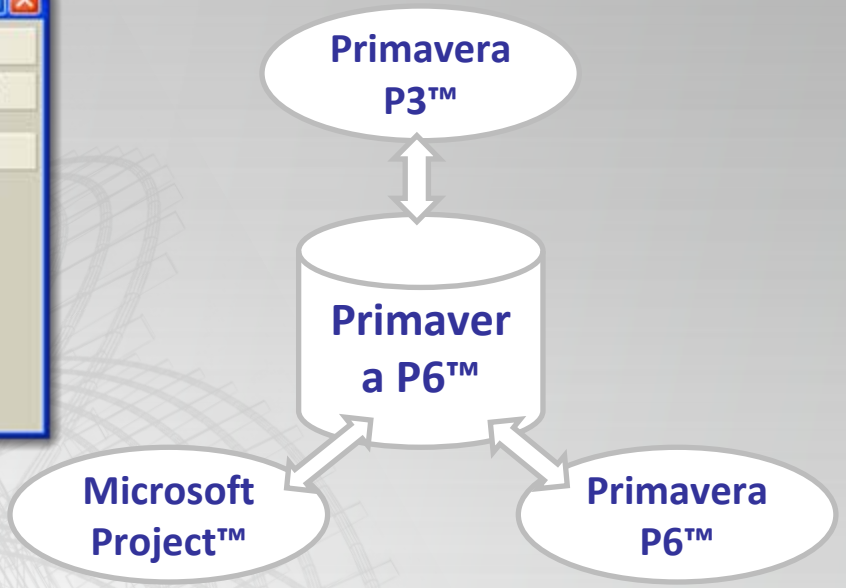
- **Planning Considerations** – project level or contractual requirements as well as internal organizational requirements
  - Application Integration
  - Global/Project Structures
    - *Project Definition and Coding – Global*
    - *Work Breakdown Structure (WBS) – Project*
    - *WBS Coding – Global*
    - *Activity Code Structures – both Global and Project*
    - *Activity Structures (ID's and Naming Conventions) – Project*
    - *Resources – Global*
    - *Calendars – both Global and Project*
  - Resource / Cost Requirements – loading/allocation and maintenance
  - Durations and Defined Workday
  - Schedule Calculation Rules
  - Optimization and Reporting

Maintain Consistency

1. Global Structures
2. Project Structures

Plan for Schedule Planning & Development

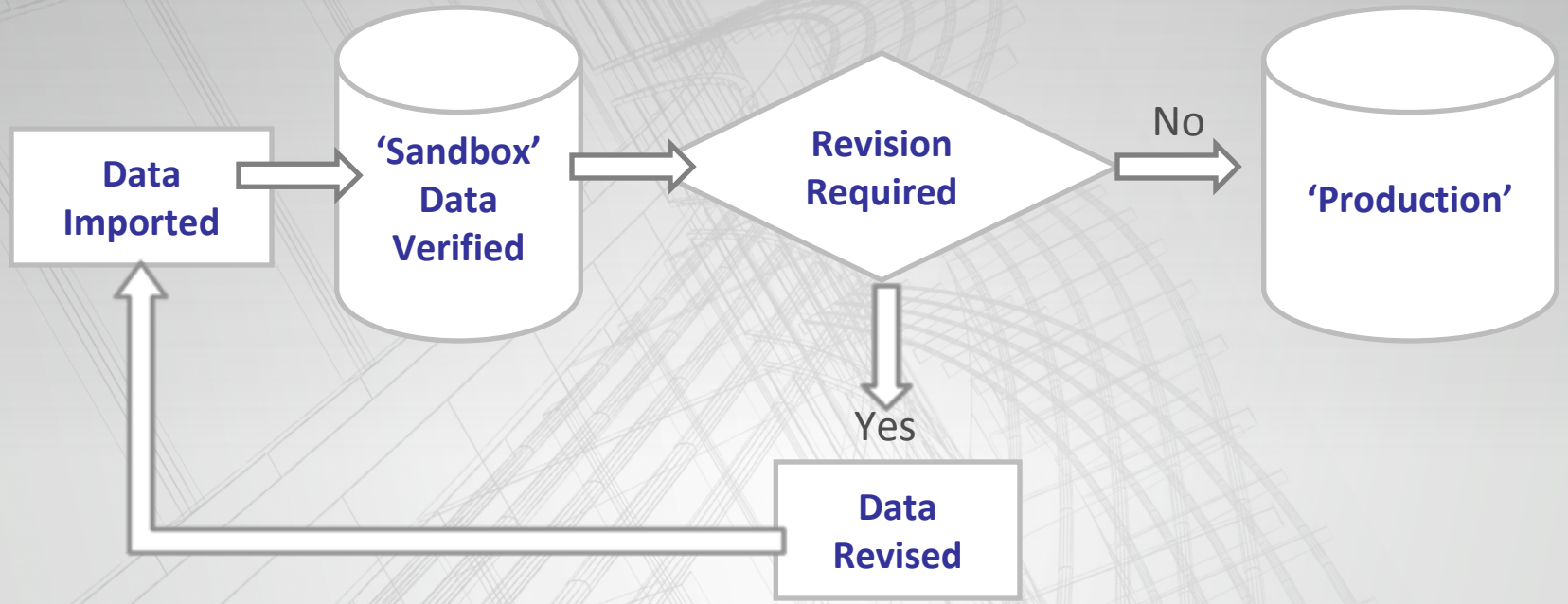
- Scheduling System Integration Considerations
  - Export Format and Import Templates – XML/XER exports and Import Configurations



  - Integration with Primavera P3™
  - Integration with Microsoft Project™
  - Integration with other Primavera P6™ (other versions)

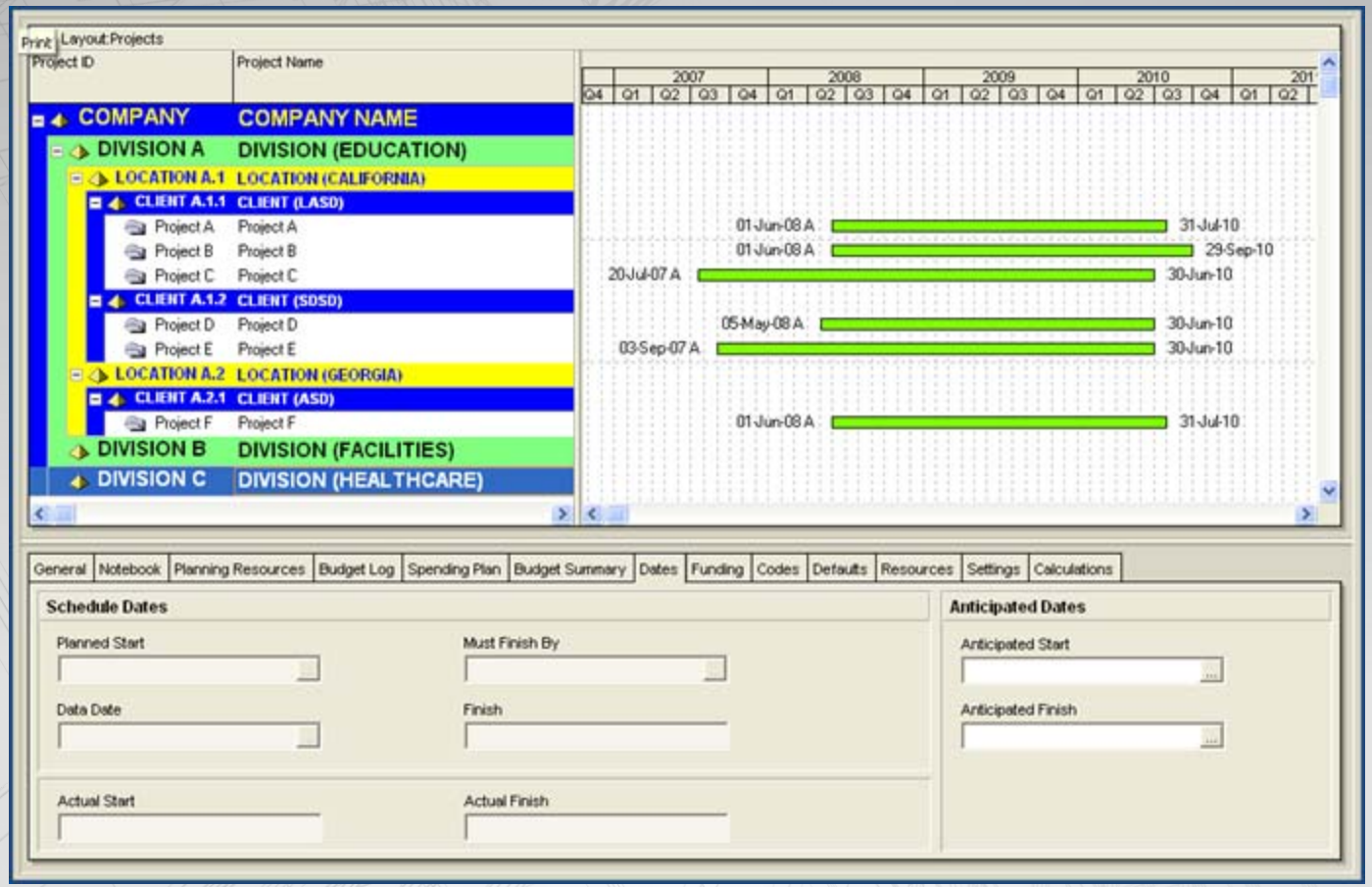
Plan for Schedule Planning & Development

- Organization of Databases within Primavera P6™
  - Production database – working, 'live' database
  - Intermediary/'Sandbox' database – review (possible training) database, used for data scrubbing



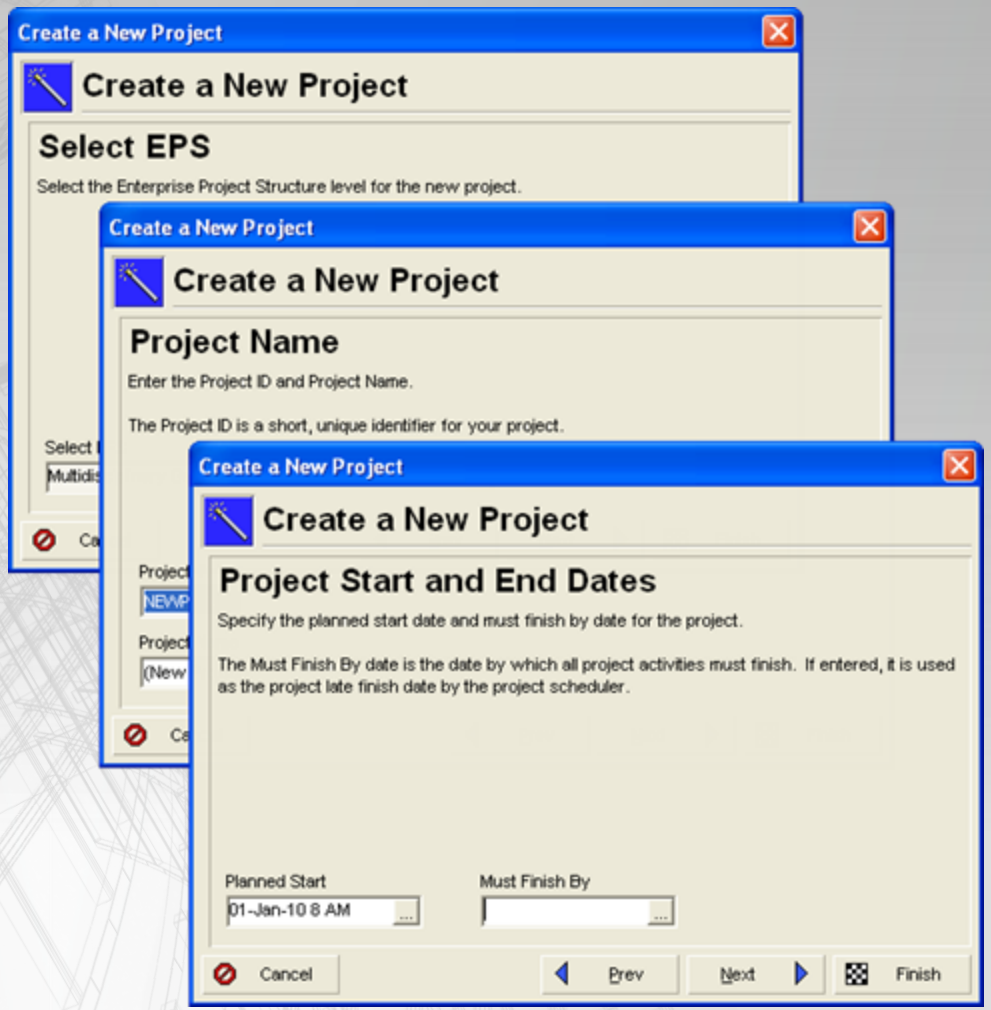
Plan for Schedule Planning & Development

- Enterprise Project Structure (EPS)
  - Organizes projects in the database
  - By Division , Location, Client, etc.



Plan for Schedule Planning & Development

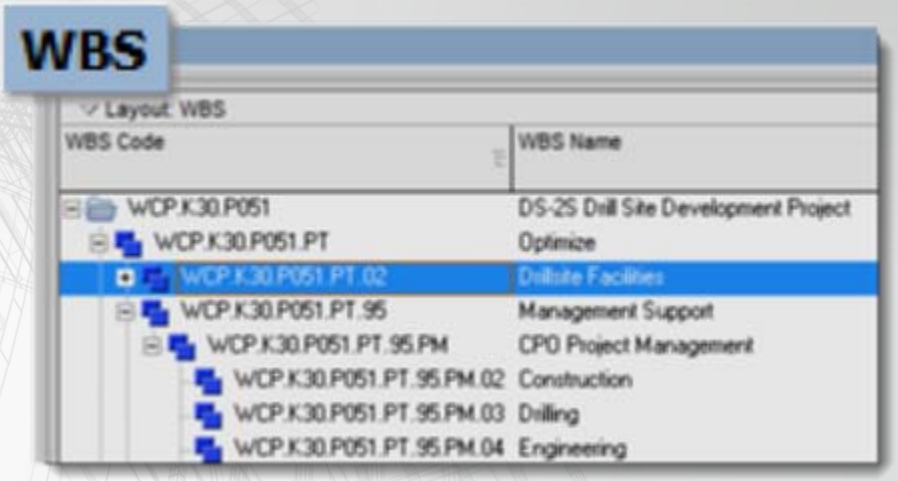
- Adding the Project (using the Create a New Project ‘wizard’)
  - Enter the Project Basics
  - Project ID (20 alpha-numeric characters) to uniquely identify the individual schedule file or type of schedule (e.g. Current, Baseline, What-if, TIA, etc.)
  - Schedule Planned Start
  - Must Finish By (if required)



Identify Project Structure – Activities

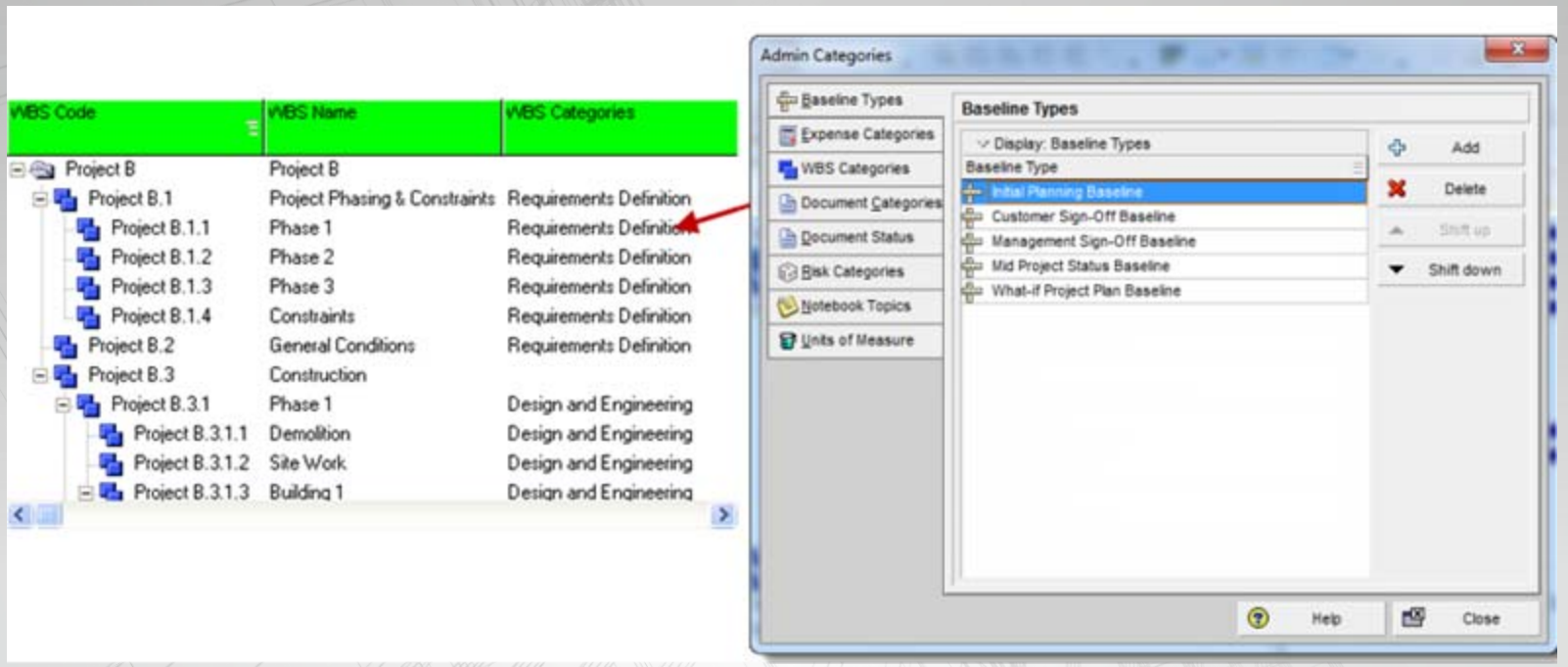
- Start with Structures

  - Work Breakdown Structure (WBS) – Project specific
    - *<u>Hierarchical</u> breakdown of the project (e.g. Phase, Area, Location, etc. and/or Cost Breakdown)*
    - *Used in standard layouts (reports)*
    - *Standard for grouping activities within Primavera*
    - *Used for Earned Value calculation settings*
    - *Copy / Paste functionality*
    - *Pred/Succ organization*
    - *WBS Summary Activities*



Identify Project Structure – Activities

- Start with Structures
  - WBS Categories – ***GLOBAL***
    - *Code WBS levels (Admin menu, Admin Categories)*
    - *Group activities across the Enterprise*

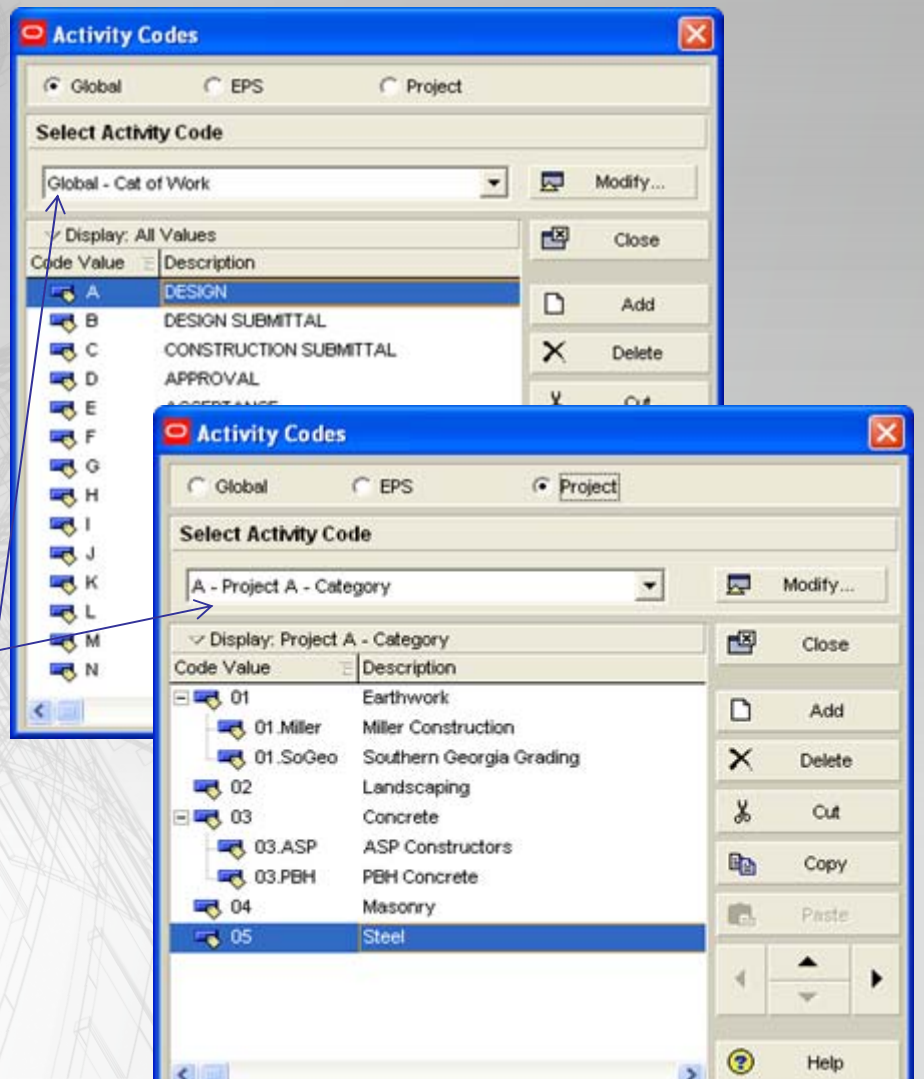


Identify Project Structure – Activities

- Start with Structures – hierarchical activity structure
  - Activity Codes structure (Enterprise menu, Activity Codes)
    - *Global*
    - *EPS*
    - *Project*
  - Consider existing structures
    - *Use standard naming convention to avoid system confusion (data transfer)*

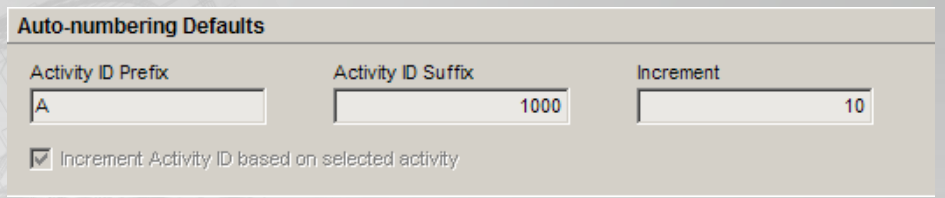
Global Code –
'Global' + *Code Name*

Project Code –
'Project Identifier' + *Code Name*



Identify Activities

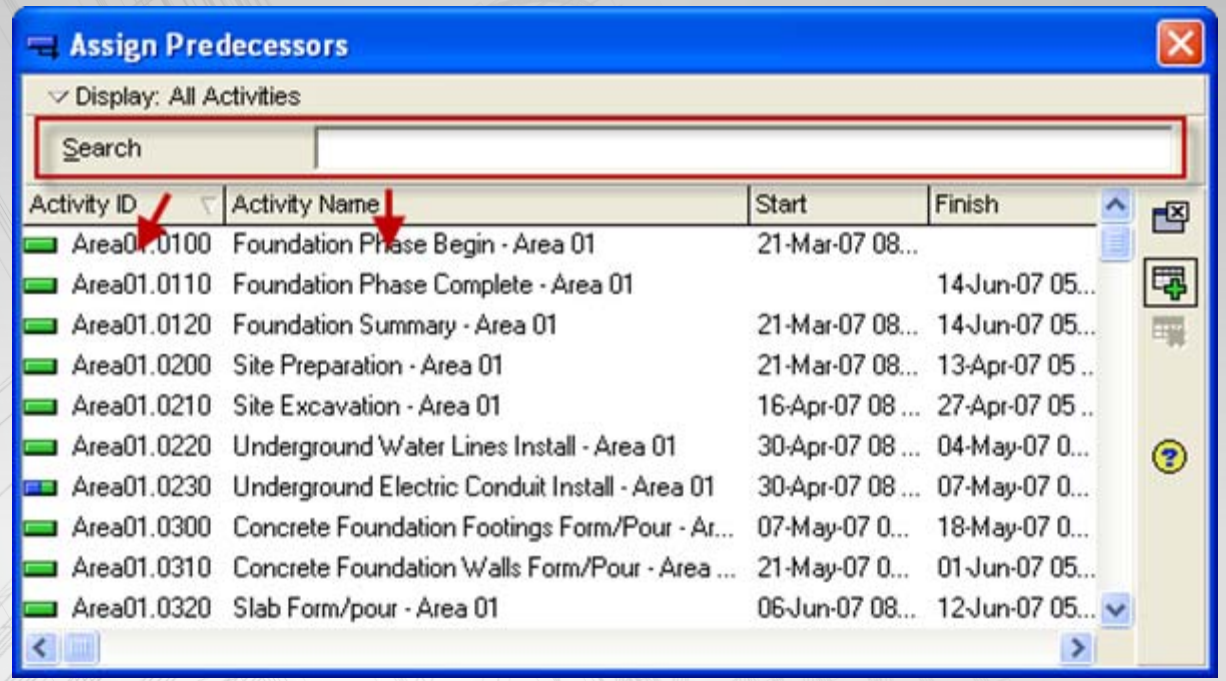
- Activity ID
  - Smart ID (i.e. CSI division or location identifier)
  - 20 (*up to* 40) alpha-numeric characters but consider limiting to 10 characters if importing / exporting to P3/SureTrak, or older versions of P6
  - Auto-numbering (Project Details, Defaults tab)



  - Can be modified easily in P6 v.7 and later (Edit menu, Renumber Activity IDs)
    - *Increment Activity ID*
    - *Auto number*
    - *Replace Beginning Characters*

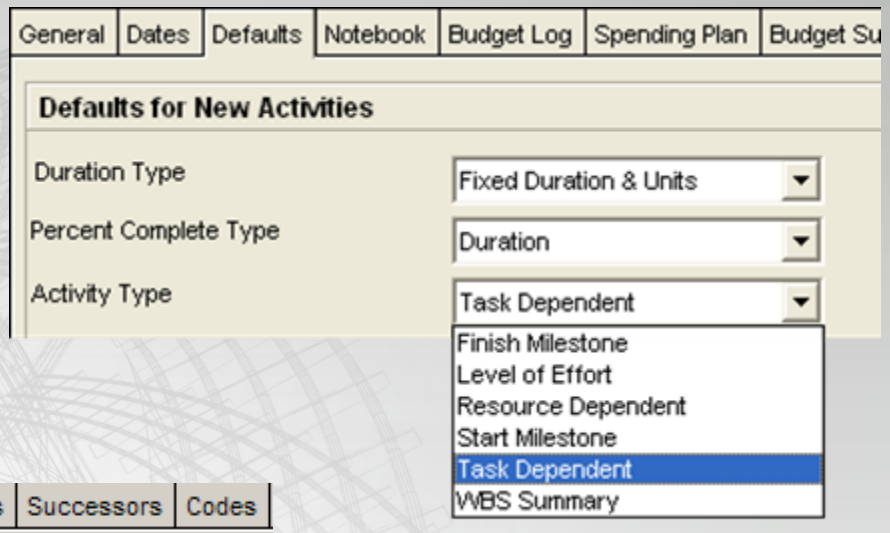
Identify Activities

- Activity Name
  - Clear, concise, and consistent
  - Keyword as left-most word in name (i.e. Subject or Noun + Verb) – a helpful for Sorting, Searching in Predecessor/Successor windows
  - 120 characters but limit to 48 characters if importing / exporting to P3 / SureTrak

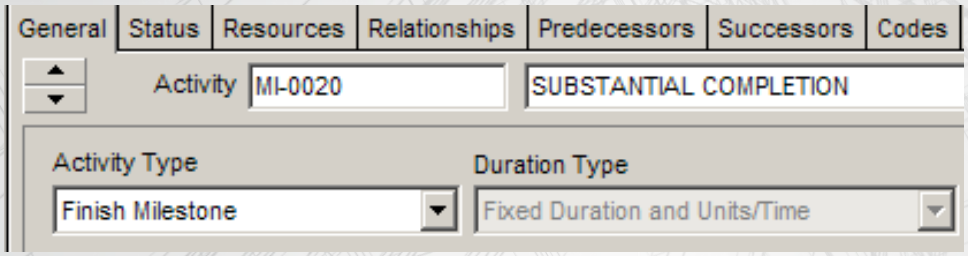


Identify Activities

- Six Activity Types
  - Milestones – Start and Finish Milestones
  - Task Dependent and Resource Dependent
  - Level of Effort and WBS Summary
  - Default Activity Type is set at project level (Project Details, Defaults tab)



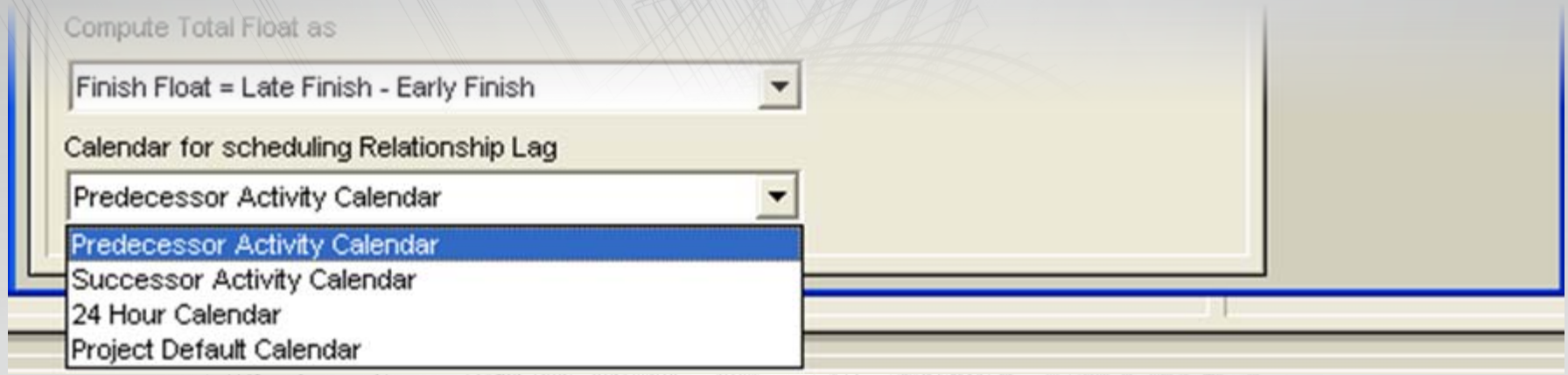
- Modify Activity Type per activity (Activity Details, General tab)



Develop Schedule Logic

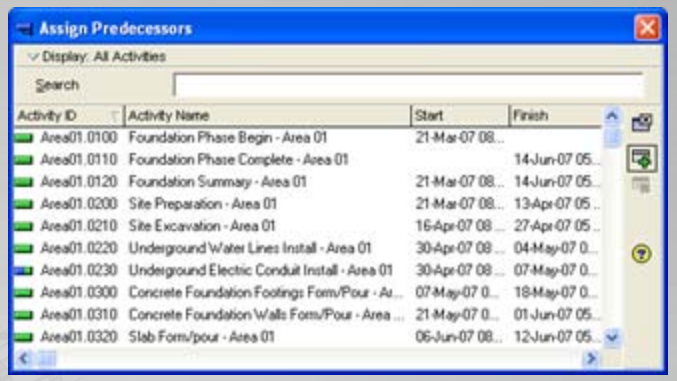
- Four Precedence Relationship Types
  - Finish to Start (FS), Finish to Finish (FF), Start to Start (SS), Start to Finish (SF)

- Lags and Leads
  - Scheduling Option (Tools menu, Schedule, Options) to choose which calendar determines lags / leads

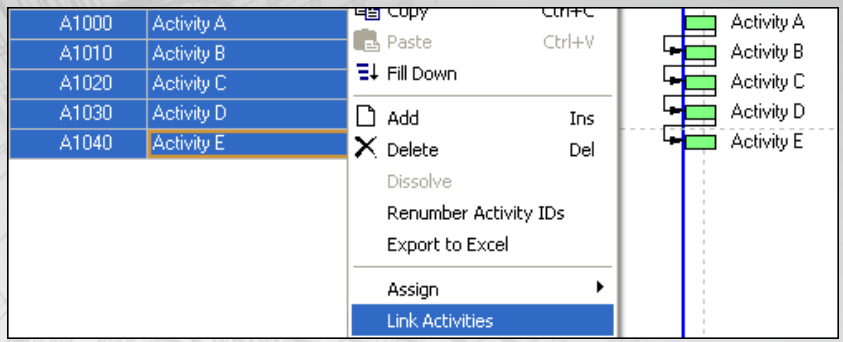


Develop Schedule Logic

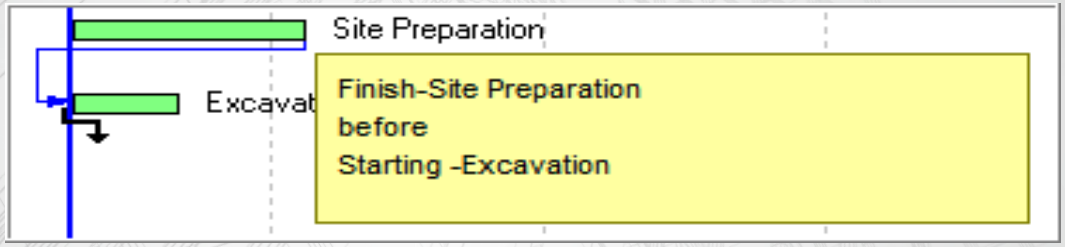
- Three Methods for Assigning Relationships
  - Predecessor and Successor Windows (Group and Sort by, Columns)



  - Linking Activities (no 'Unlink' option)

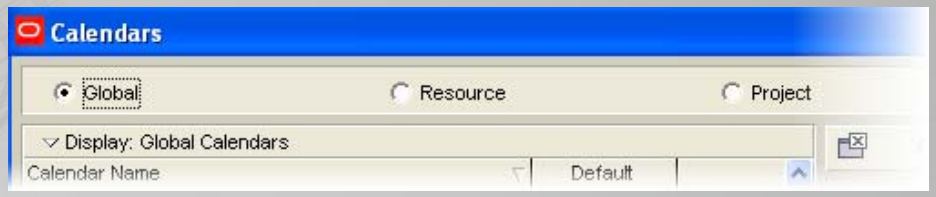


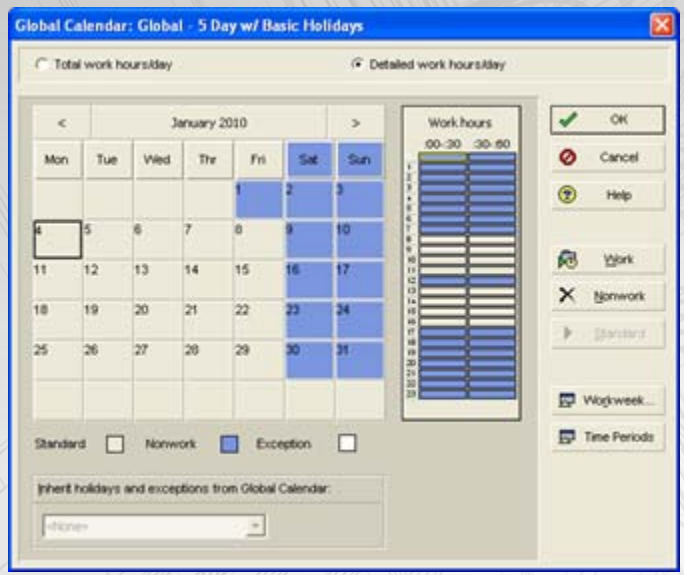
  - 'Drawing' Relationships



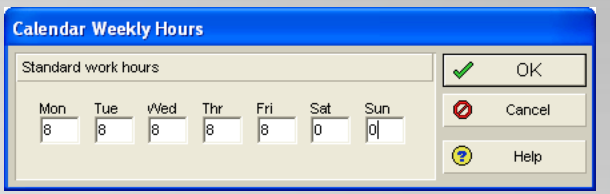
Estimate Durations

- Calendar Types (Enterprise menu, Calendars)
  - Global (database) – templates
  - Resource
  - Project (project specific)
- Work Periods - System calendars are set to 8 hour work periods.

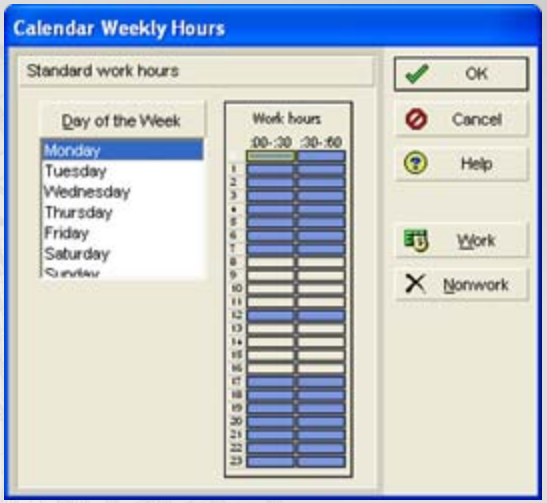




TOTAL



DETAILED

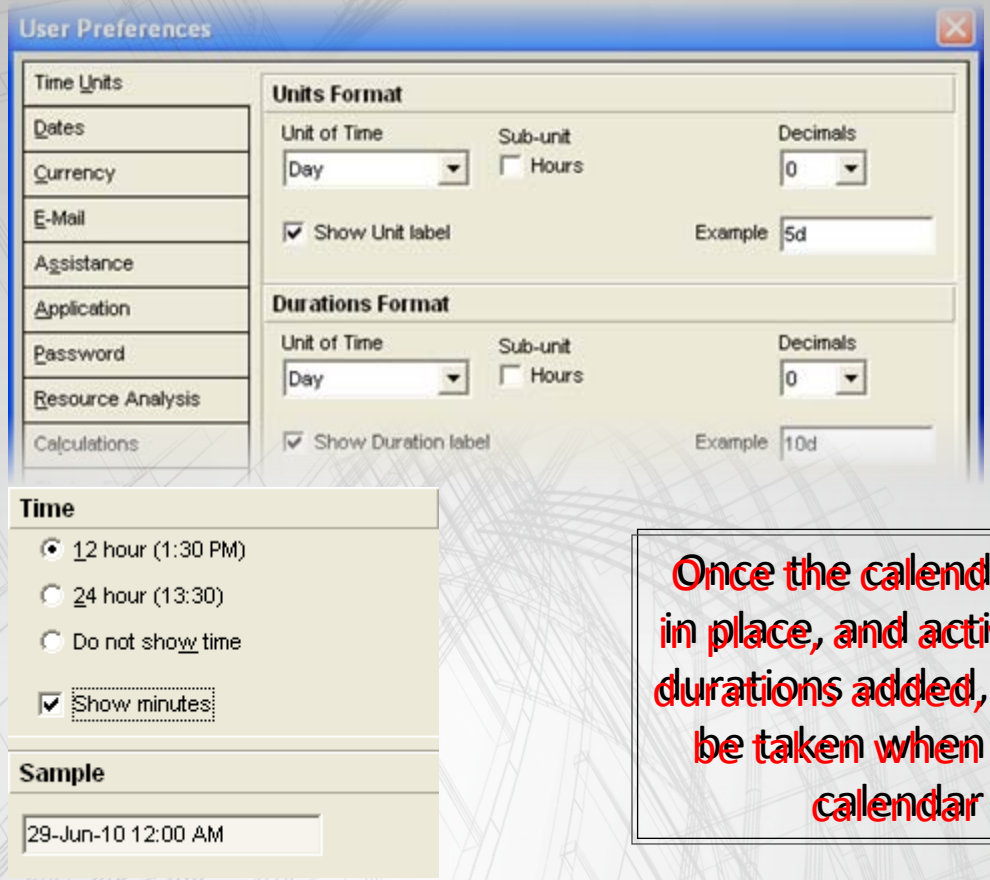


Important – P6 always calculates to the minute

Estimate Durations

- Preferences (Admin vs User) for calculating and displaying data:
  - TIME UNITS (Edit menu, User Preferences, Time Units tab)

    Check Dates and Times (Start/Finish) (Edit menu, User Preferences, Dates tab)



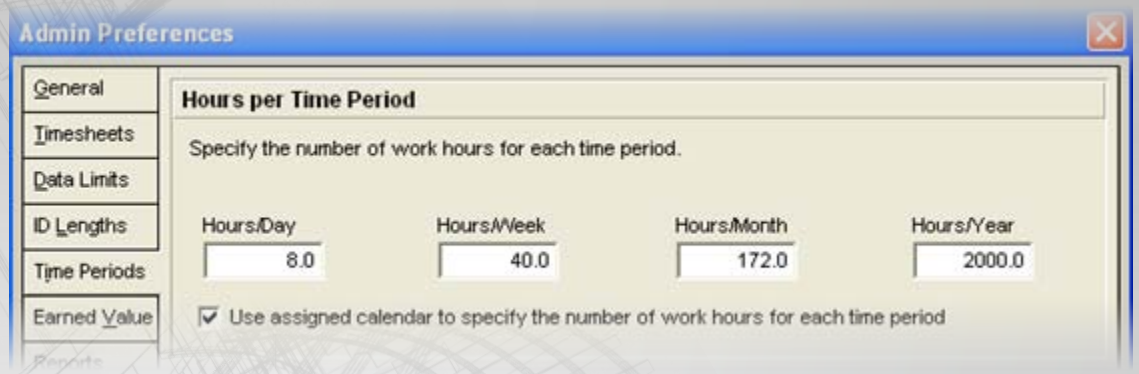
Once the calendar settings are in place, and activities and their durations added, caution should be taken when changing the calendar 'rules'!

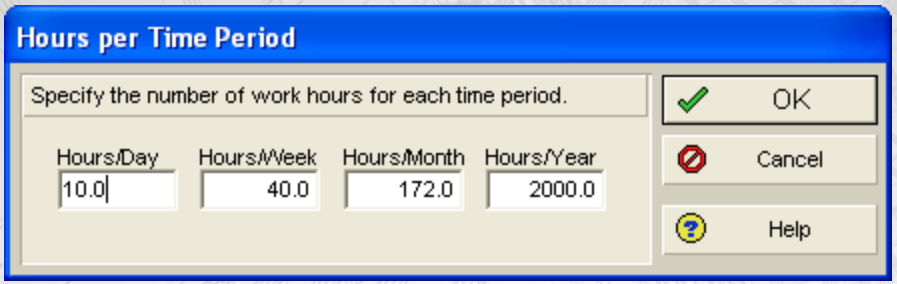
Estimate Durations

- TIME PERIODS (Admin menu, Admin Preferences, Time Periods tab)

  Version 7 and later allows workdays to be defined at calendar level

  “Use assigned calendar to specify the number of work hours for each time period”

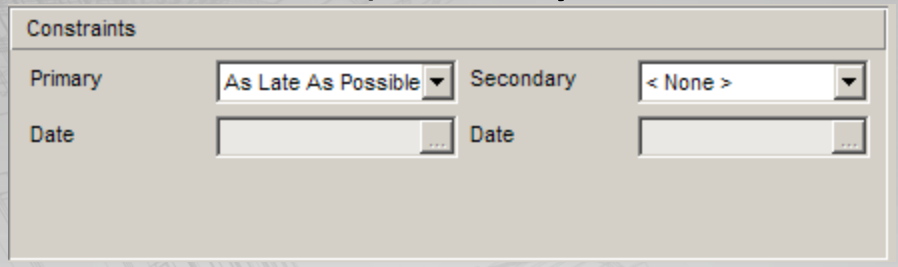




Note: Issue with BL workdays, uses 8 hours regardless of Calendar. Oracle issue # **[ID 906081.1]**

Establish Schedule Requirements

- Contract time requirements regarding start/finish dates.
- Non-precedence Constraints (Activity Details, Status Tab)
  - Primary
  - Secondary



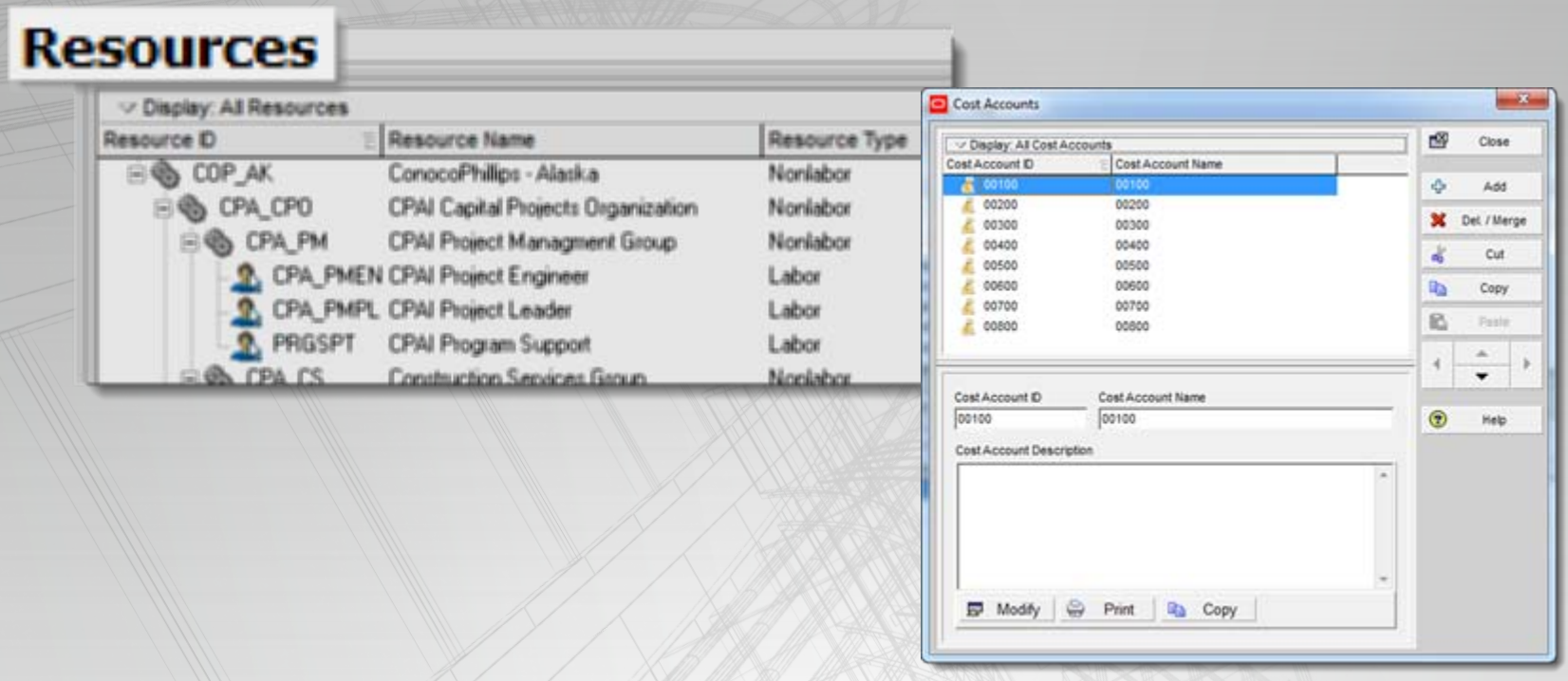
- Types

Start on or After	**Finish on**
Finish on or After	**Mandatory Start**
Start on or Before	**Mandatory Finish**
Finish on or Before	**As Late as Possible**
Start on	**Must Finish by (Project Constraint)**

P3 Users: there is no Zero Total Float option (now use Finish on or Before); there is no Zero Free Float option (now use As Late As Possible)

Allocate Resources

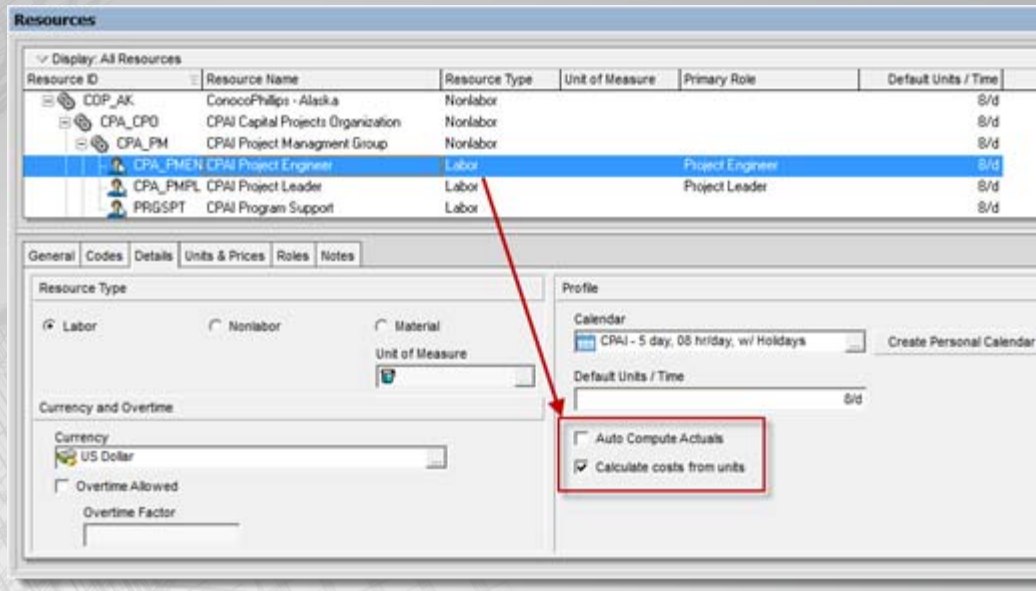
- Define Resource Breakdown Structure (RBS) and Cost Accounts – ***GLOBAL***



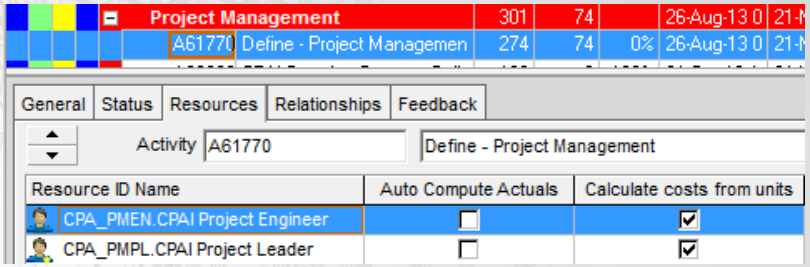
- Identify Project Resources vs. Global Resources (Example: *Project ID* + Name) using <u>hierarchical</u> structure
- Resources can be Labor, Non Labor, and Material

Allocate Resources

- Defining Resource Settings (should be initially defined)
  - Resource Details for Labor, Nonlabor, Material
    - *Auto Compute Actuals*
    - *Calculate costs from units*

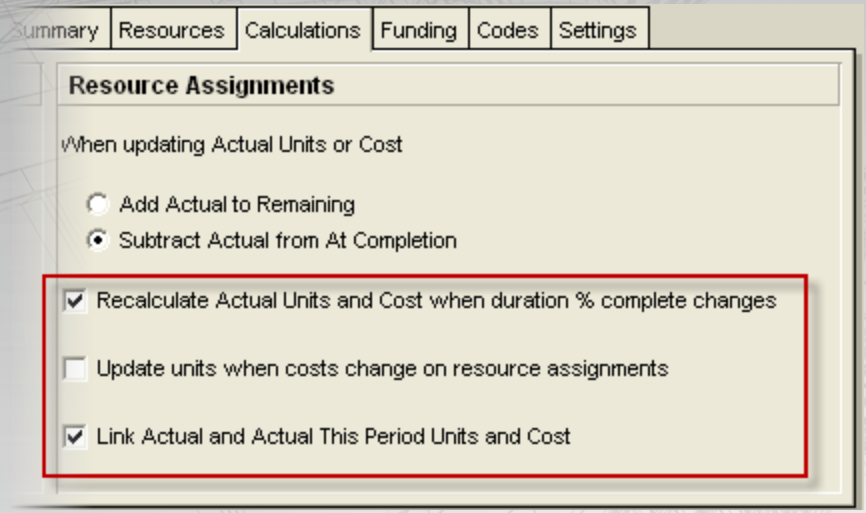


- Project and Activity Details
  - *Override Resource Details settings – Calculate Costs from Units*

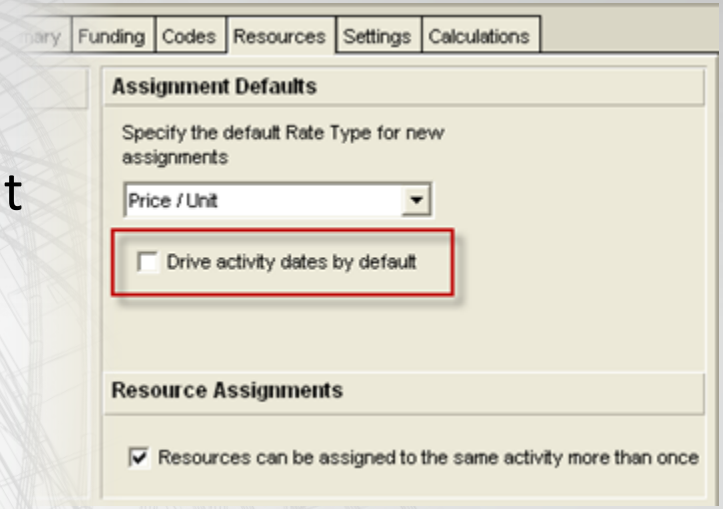


Allocate Resources

- And at Project Level (Project Details, Calculations tab)
  - Link Actual and Actual This Period Units and Costs (when using Financial Periods for storing resource actuals per period)



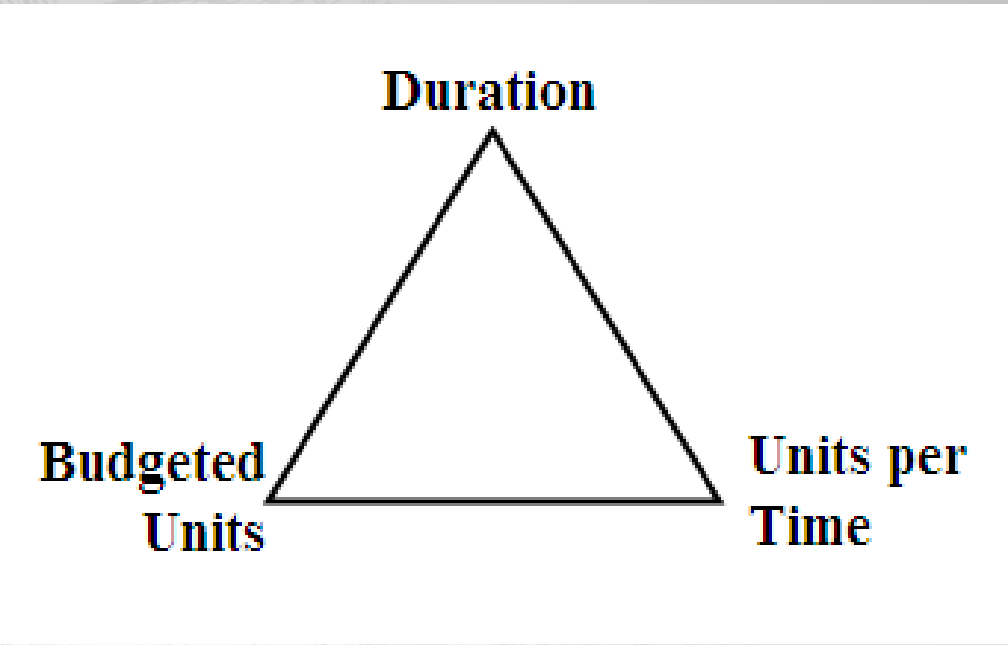
  - Resources Drive activity dates by default for resource dependent activities with resource calendars (Project Details, Resources tab)



Allocate Resources

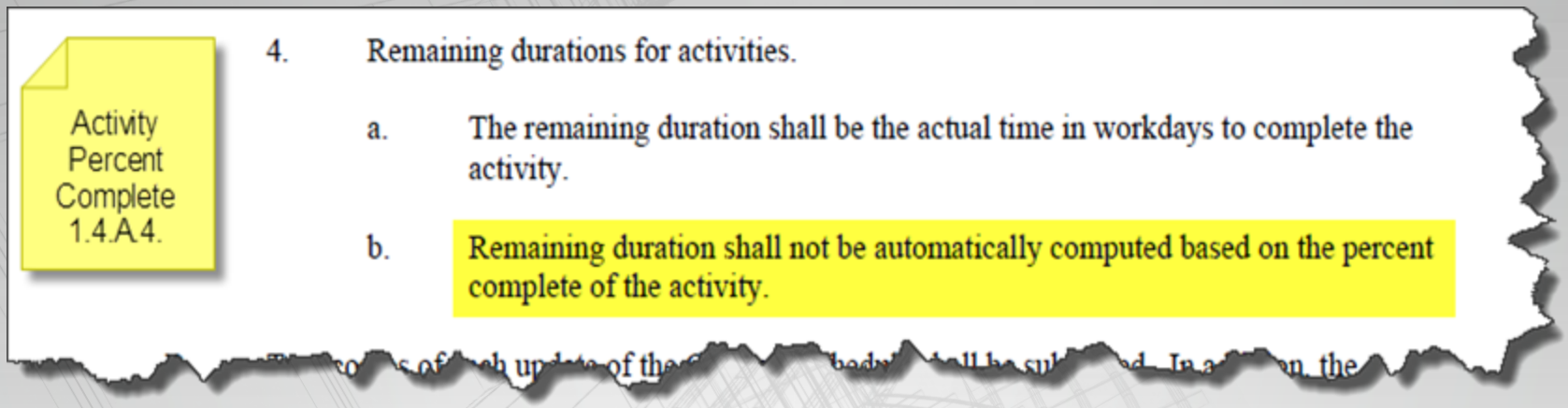
Other Project level defaults to consider *prior to developing activity list* (can be set to specific activities)

- Duration Types
  - Fixed Duration and Units ***(default)***
  - Fixed Duration and Units/Time
  - Fixed Units
  - Fixed Units/Time



Allocate Resources

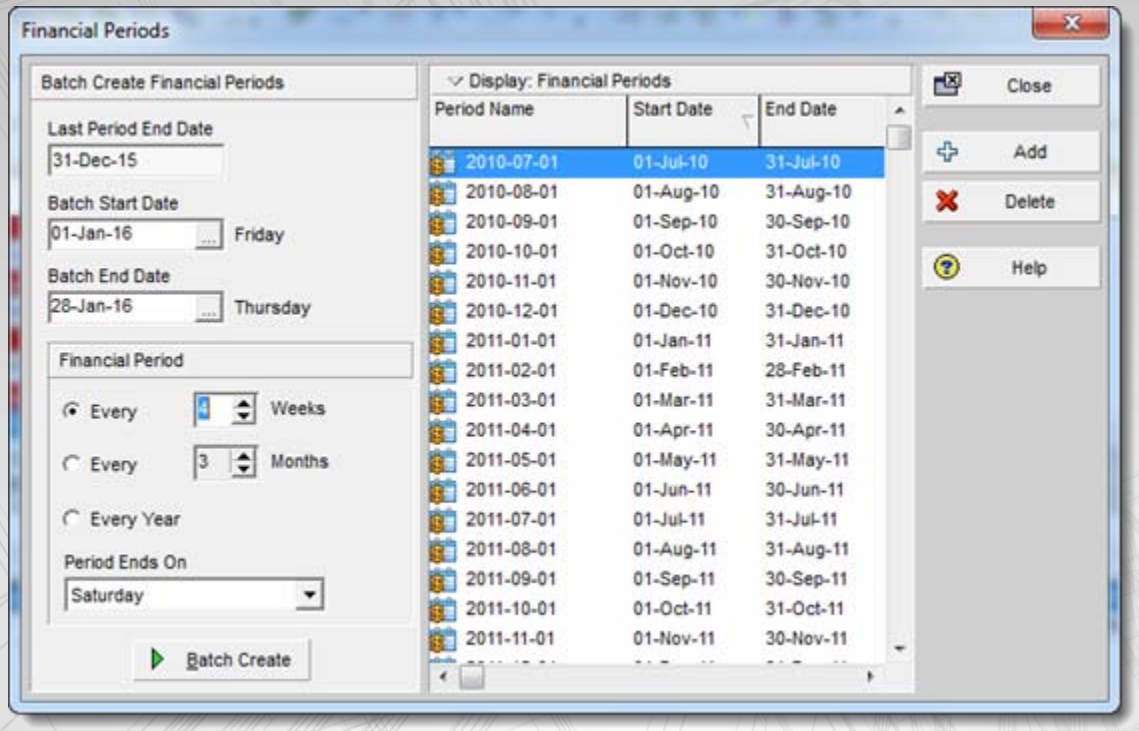
- Percent Complete Types
  - Duration Percent Complete ***(default)*** – *calculated*
  - Physical Percent Complete – *manual entry*
  - Units Percent Complete – calculated



- Default type defined at the Project Level (Projects Details, Defaults tab) but can be modified at the Activity Level (Activity Details, General Tab)
- Project Level defaults *only* apply to new activities.

Allocate Resources

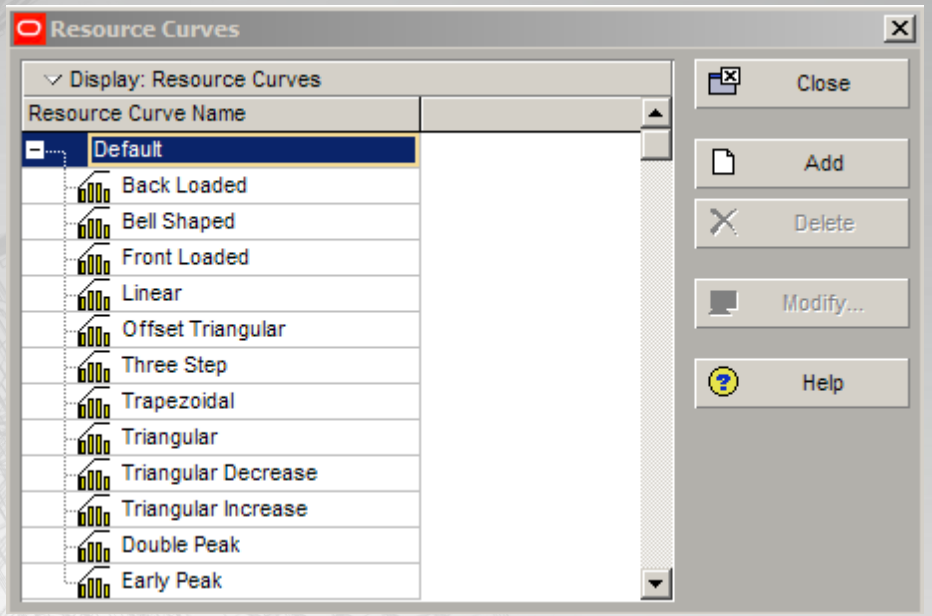
- Financial Periods (Global) – used for storing and distributing past period resource actuals per defined period
  - Periods are defined at Admin level for ***ALL*** projects in the database (Admin menu, Financial Periods)



Allocate Resources

- Resource Distribution and Curves / Future Bucket Planning
  - System Default and User – used for future redistributions from the standard linear resource spread;

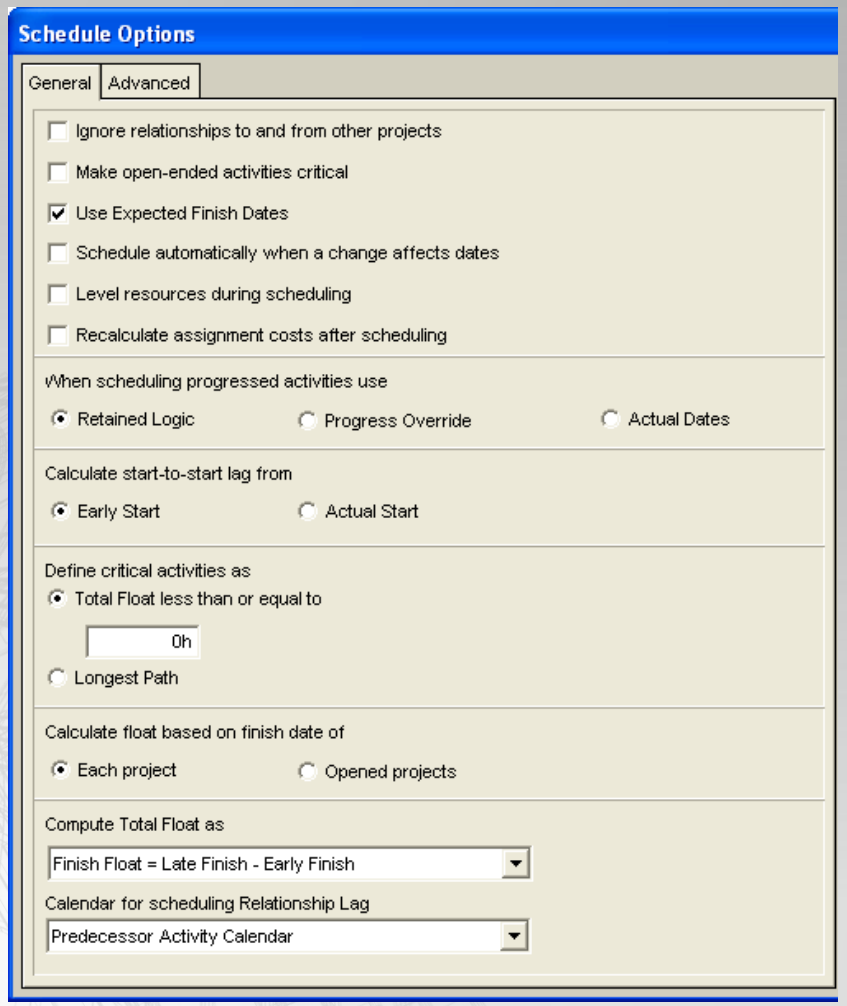
    Global (Enterprise menu, Resource Curves)



  - Can add new curves by copying a default curve and modifying settings
  - Assign at the activity level (Activity Details, Resources tab)

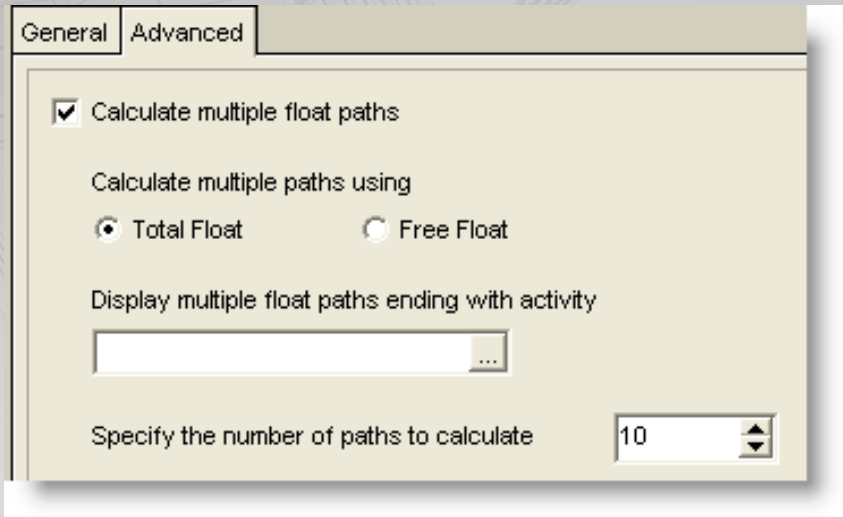
Optimize Schedule

- Schedule Options – project specific
  - General
    - *Relationships to and from other projects*
    - *Open ends*
    - *Schedule Calculation options*
      - Retained Logic
      - Progress Override
      - Actual Dates
    - *Critical activity definition*
    - *Calculate SS lag – Early or Actual*
    - *Float definition*
    - *Calendar for scheduling relationship lag*



Optimize Schedule

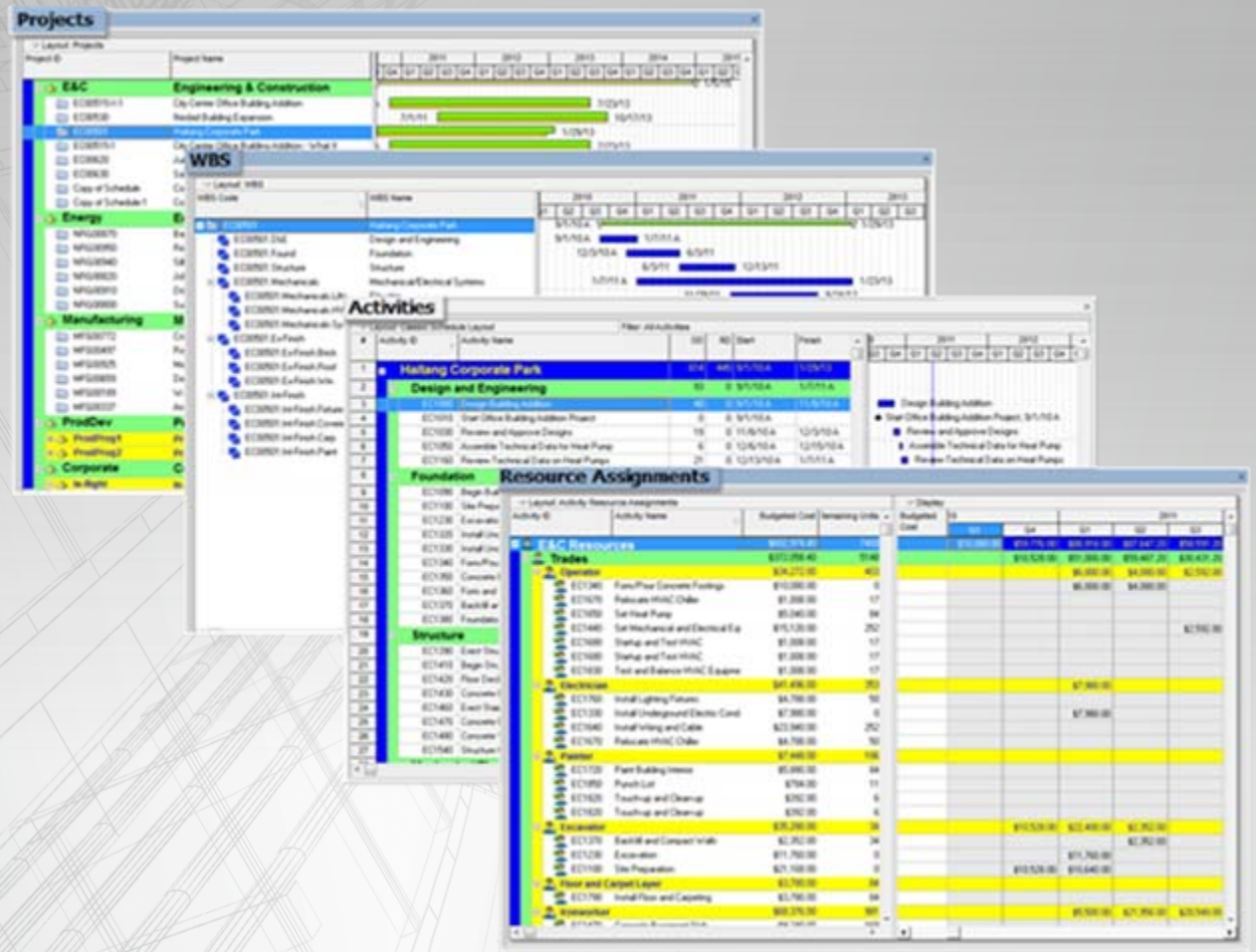
- Schedule Options
  - Advanced
    - *Calculate multiple float paths by either Total Float or Free Float*



For more information regarding multiple float paths read 'Longest Path to the Rescue' by Ron Winter.

Optimize Schedule – Graphic Reports

- Layouts are developed by modifying data within Primavera P6™ windows

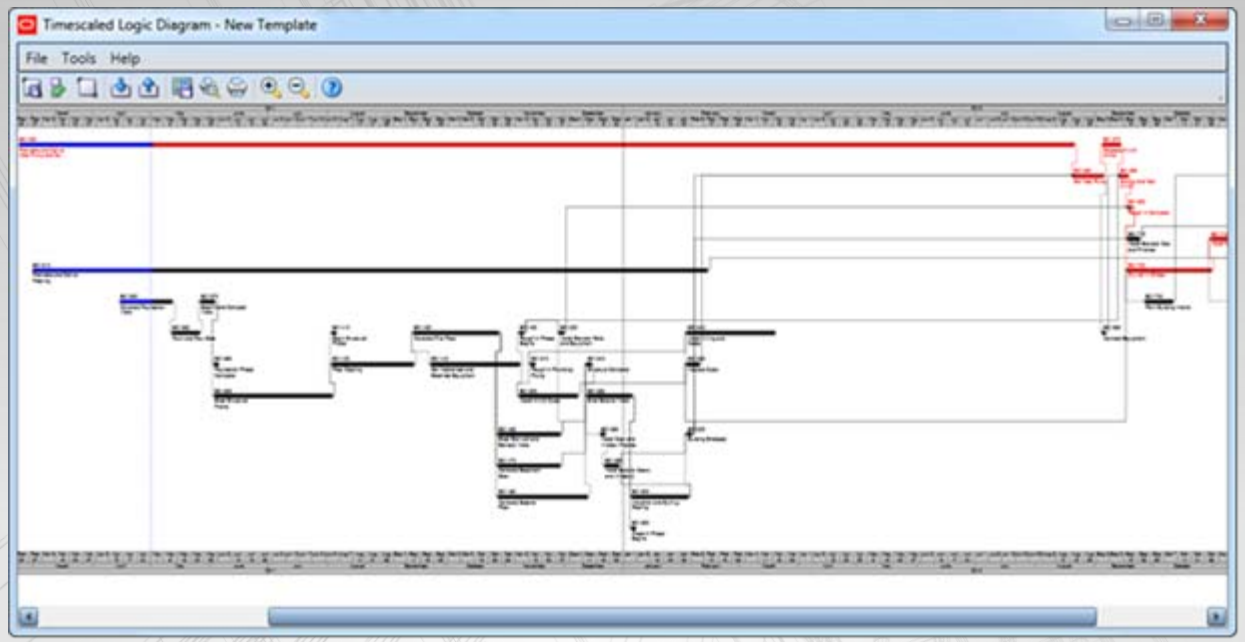


Optimize Schedule – Layout Types

- Layout Types:
  - User
    - *Available to a single user, for all accessible projects in the database*
  - Global
    - *Available to all users, for all projects in the database*
  - Project
    - *'Linked' to a single project, for project specific reporting requirements*
    - *Can export the layout with project file when using XML export option*
  - Visualizer (later versions)

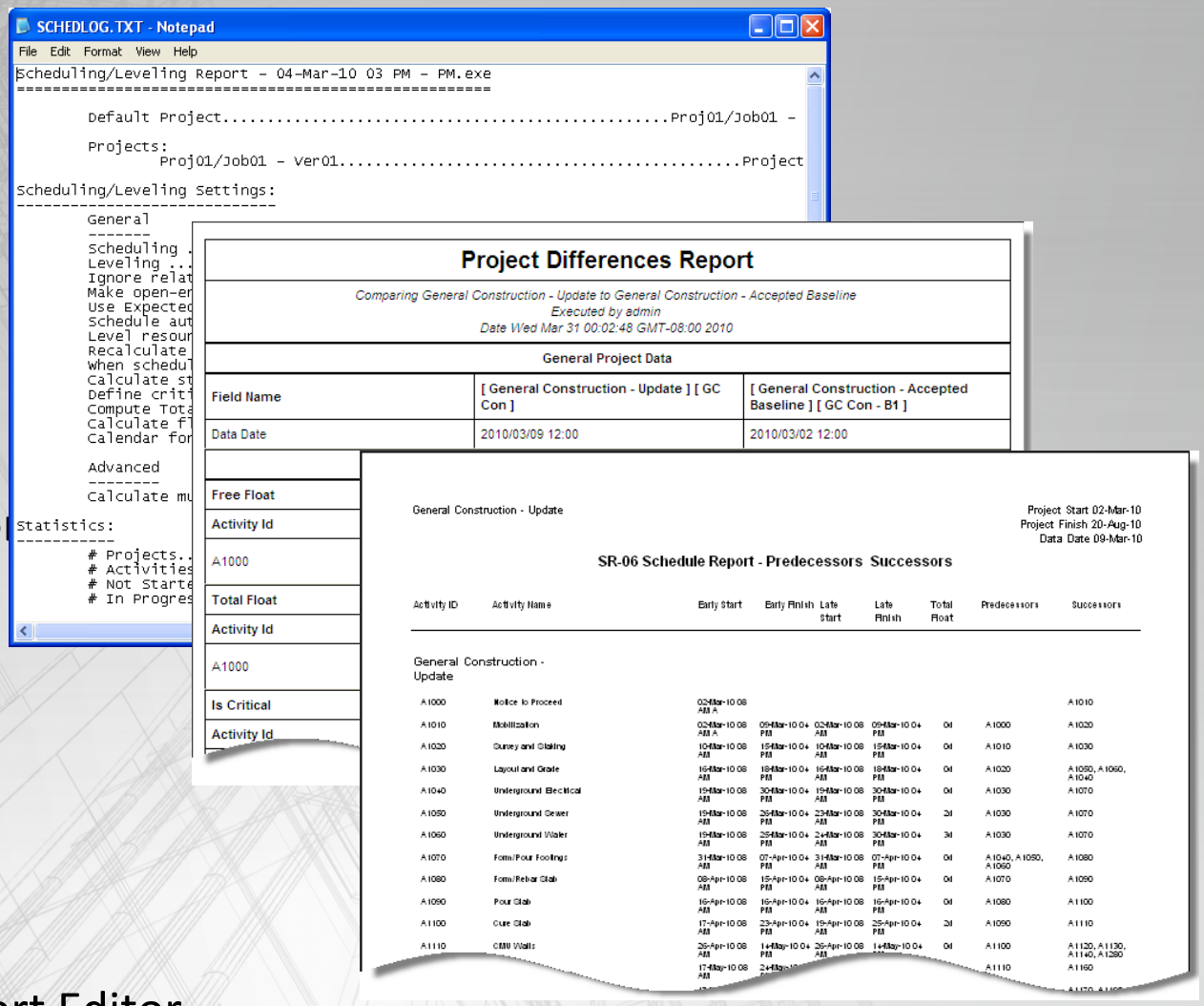
Optimize – Time-scaled Logic OR Visualizer

- Time scaled Logic Diagram or Visualizer
  - Available in Primavera P6™ version 7 through version 8.2
  - Replaced by Oracle® Primavera Visualizer in version 8.3 and later



Optimize Schedule – Tabular Reports and Logs

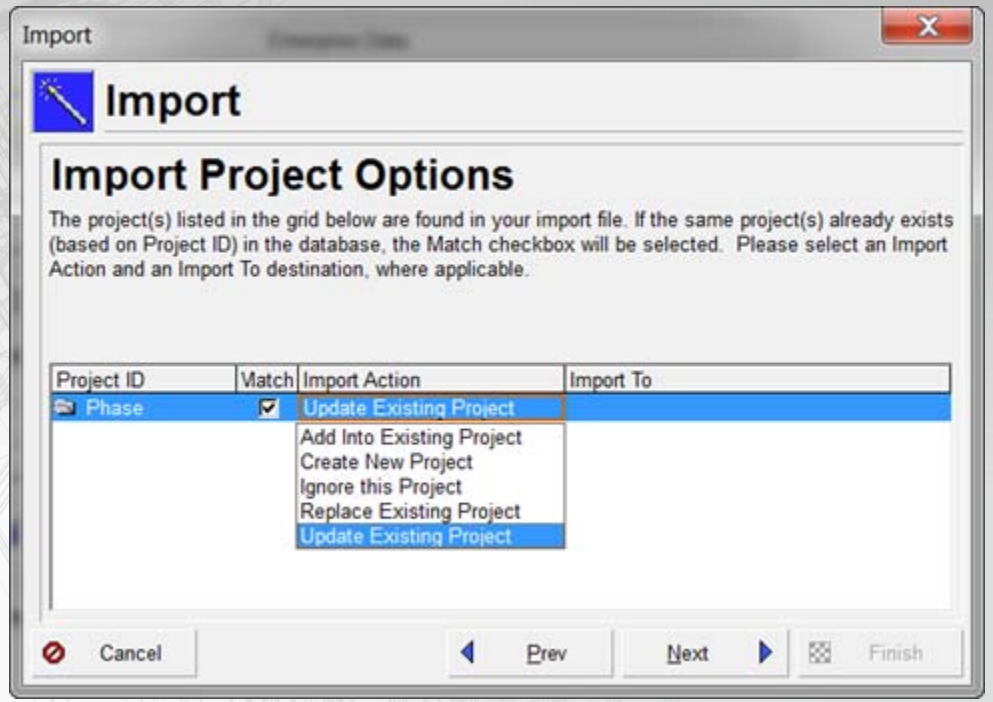
- Schedule Log
- Claim Digger
  - Schedule Comparison
- Tabular Reports
  - Report Wizard, Report Editor



Data Transfer

- Importing Project Data depends on XER or XML
  - Add into Existing Project
  - Create New Project
  - Ignore this Project
  - Replace Existing Project
  - Update Existing Project

Note: To import past period actual data you must select ‘Create New Project’.



Data Transfer

- Import Configuration utility – how to handle duplicate data.
  - Do Not Import
  - Insert New
  - Keep Existing
  - Update Existing
  - Delete

A* = Same ID but modified data

Do Not Import		Insert New		Keep Existing		Update Existing	
Existing	New	Existing	New	Existing	New	Existing	New
A	A*, B	A	A*, B	A	A*, B	A	A*, B
A (*after import*)		A, A*, B (*after import*)		A, B (*after import*)		A*, B (*after import*)	

Conclusion

- Start with a Plan
- Setup Structures (EPS, WBS, Codes)
- Maintain Consistency (IDs, Calendars, Activity Names)
- Verify Start/Finish Times to Avoid Calendar Errors
- Use Caution in Modifying or Applying Global/Enterprise/Admin to a *project* schedule
- Set Resources options/defaults correctly from the start
- Understand Schedule Calculation options
- Use the Tools provided to optimize the schedule (i.e. Schedule Log, Layouts, Reports, etc.)

Contact Information

- We hope that you can use these implementation and execution lessons learned outlined in this presentation to develop schedules more efficiently using Primavera P6™
- Please contact us should you have questions regarding Primavera P6 implementation, concepts, or general use

Questions?

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