5 Coordinate and Support

▶ **The example teaches.**

A Latin proverb

This chapter presents three compound components:

1. Project-activity management
2. Accounting management
3. Document management

5.1 PROJECT-ACTIVITY MANAGEMENT

What. Project-activity management spans across all enterprise activities to be planned and executed. Project-activity management is the umbrella, the overall plan and execution, the one that activates smaller plans and executions within other components.

Scope. Project-activity management begins with a project and ends with activities.

Steps. First, establish a project. Second, make project-activity requests. Third, conduct activities. Fourth, use resource and activity pools to find workable combinations.

Links. Request material resources (material-resource management). Request manufacturing processes (manufacturing management). Request facility development (facility management). Request facility use (facility management), request inventory movement (inventory management), and request positions (human-resource management).

Components. The components within project-activity management are (Figure 5-1):

- Project-activity request
- Project activity
- Activity-and-resource pool

Moment-intervals. The pink moment-intervals for project-activity management are (Figure 5-2):

- Project
- Project-activity request
- Project activity

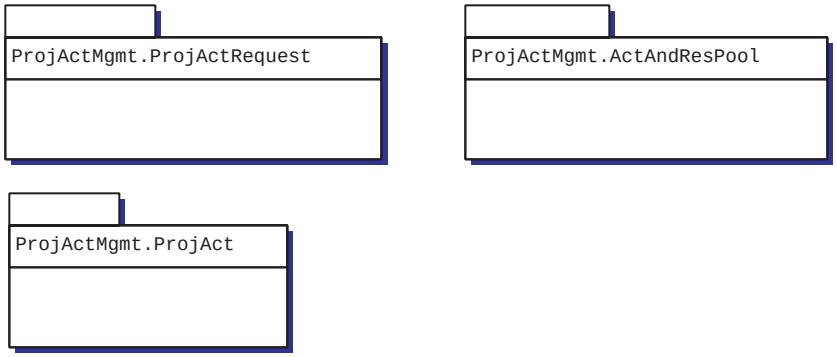

FIGURE 5-1. ▲ Project-activity management components.

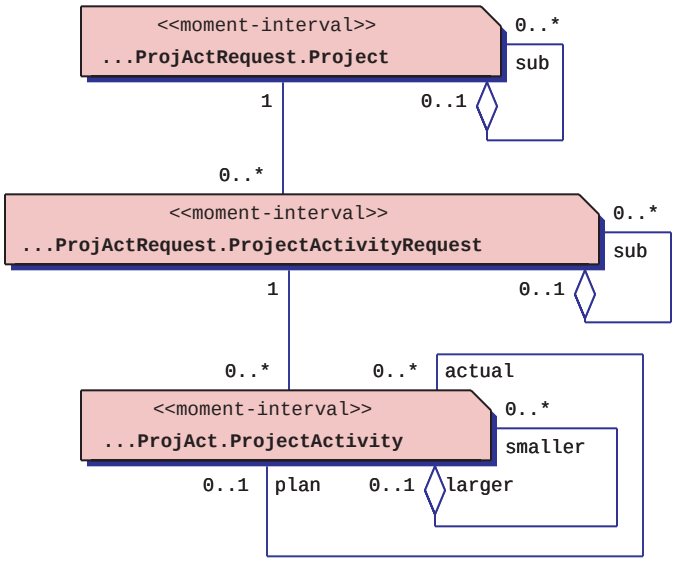

FIGURE 5-2. ▲ Summary in pink.

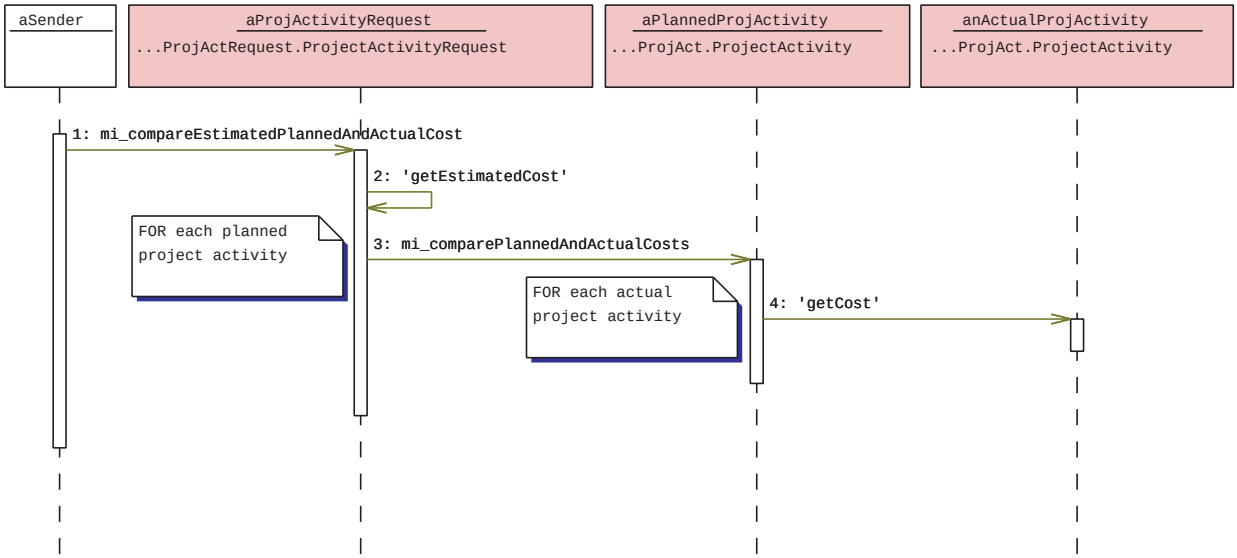

FIGURE 5-3. ▲ Compare estimated, planned, and actual cost.

Interactions. The components work together to get things done. An example of inter-component interaction, "compare estimated, planned, and actual cost," is shown in Figure 5-3. A sender asks a pink project-activity request to compare its estimated, planned, and actual cost. It gets its estimated cost. It asks each of its pink planned project-activity objects to compare its planned and actual costs. Each planned project-activity object asks each of its actual project-activity objects to get its costs. Ultimately, the project-activity request returns a comparison of estimated, planned, and actual costs.

Here's another example (Figure 5-4): A sender asks a pink project-activity request to estimate its percentage completion. The request ripples from project-activity request to each of its sub-requests (if any) to each of the corresponding project-request details and finally to component-specific requests. Ultimately, the project-activity request returns the result to the sender.

Expansion. One could expand this compound component by adding planning coordination and planning simulation, plus work-breakdown structures and other planning tools.

5.1.1 Project-Activity Request

Guided tour. The project-activity request component is shown in Figure 5-5. The project-activity request component has two pink moment-intervals, project and project-activity request.

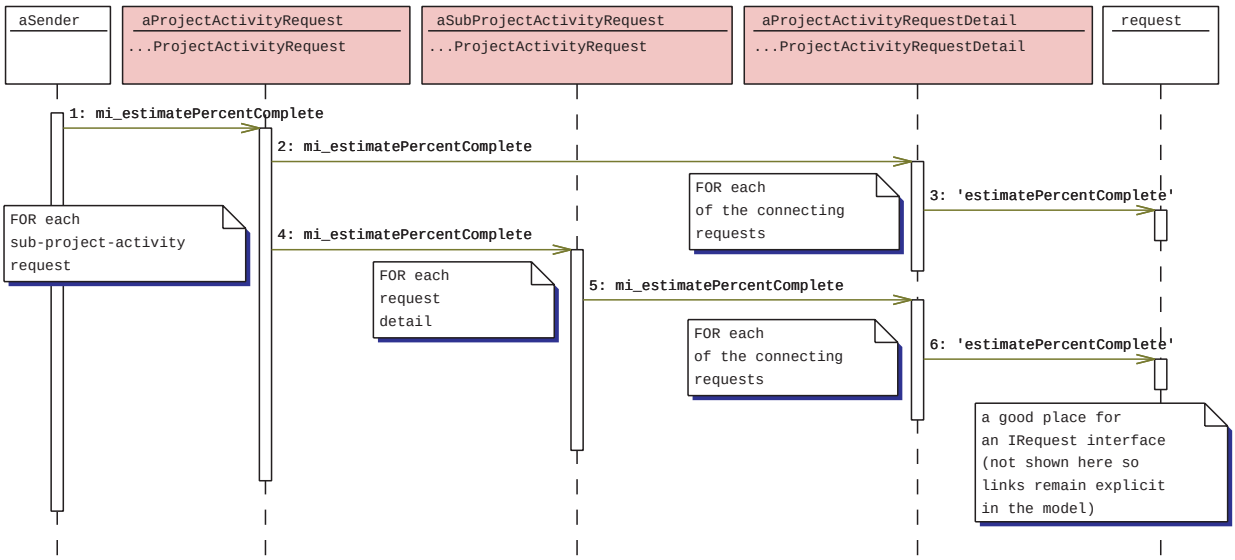

FIGURE 5-4. ▲ Estimate percent complete.

Project. A pink project links to two yellow roles: project manager and project sponsor. It also links to a pink project-activity request.

Project-activity request. A pink project-activity request links to two yellow roles: activity requester and activity planner. It links to a yellow organization-with-activity-to-accomplish role. It also links to pink project-activity request detail(s).

Project-activity request detail. A pink project-activity request detail specifies interval and status, along with a link to one or more of the following:

- Materials request
- Production request
- Facility-development request
- Facility-use request
- Facility-maintenance request
- Movement request
- Position request

Activity-request pool. A green activity-request pool is a collection of project-activity requests. It monitors those requests, selecting the next one; it asks that "next one" to generate a project activity.

Before and after. For project-activity request, the subsequent pink moment-intervals are budget request and project activity. For

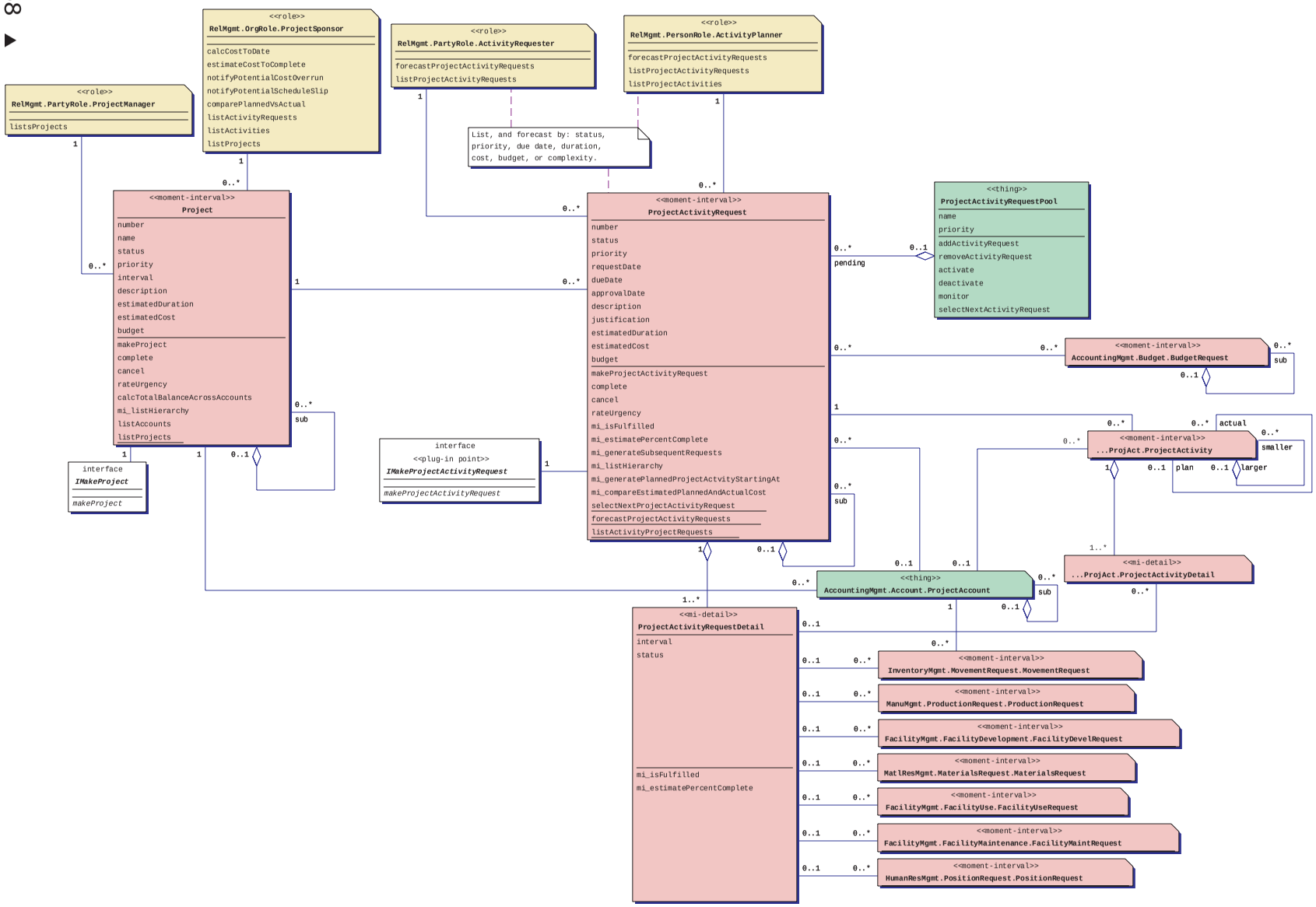

FIGURE 5-5. ▲ Project-activity request component.

project-activity request detail, the subsequent pink moment-interval details are project-activity detail, along with materials request (materials management), production request (manufacturing management), facility-development request (facility management), facility-use request (facility management), facility-maintenance request (facility management), movement request (inventory management), and position request (human-resource management).

Methods. Key methods include: make project-activity request, activate an activity pool, rate urgency, and generate project activity.

Interactions. The "activate an activity-request pool" sequence is shown in Figure 5-6. A sender asks a green activity-request pool to activate itself. The pool starts monitoring the requests in the pool. It selects the next project-activity request by asking each pink request to rate its urgency (for example, it might get its priority and get its due date). It selects the winning project-activity request and asks it to generate a corresponding project activity. The project-activity request sends a message to the project-activity class to create a new project-activity object, then asks that object to make a project activity, giving it the arguments it needs to do so.

Tip. Activate, deactivate, and monitor? Use activate/deactivate and monitor methods to express initial activation followed by some on-going behavior, running asynchronously over some period of time.

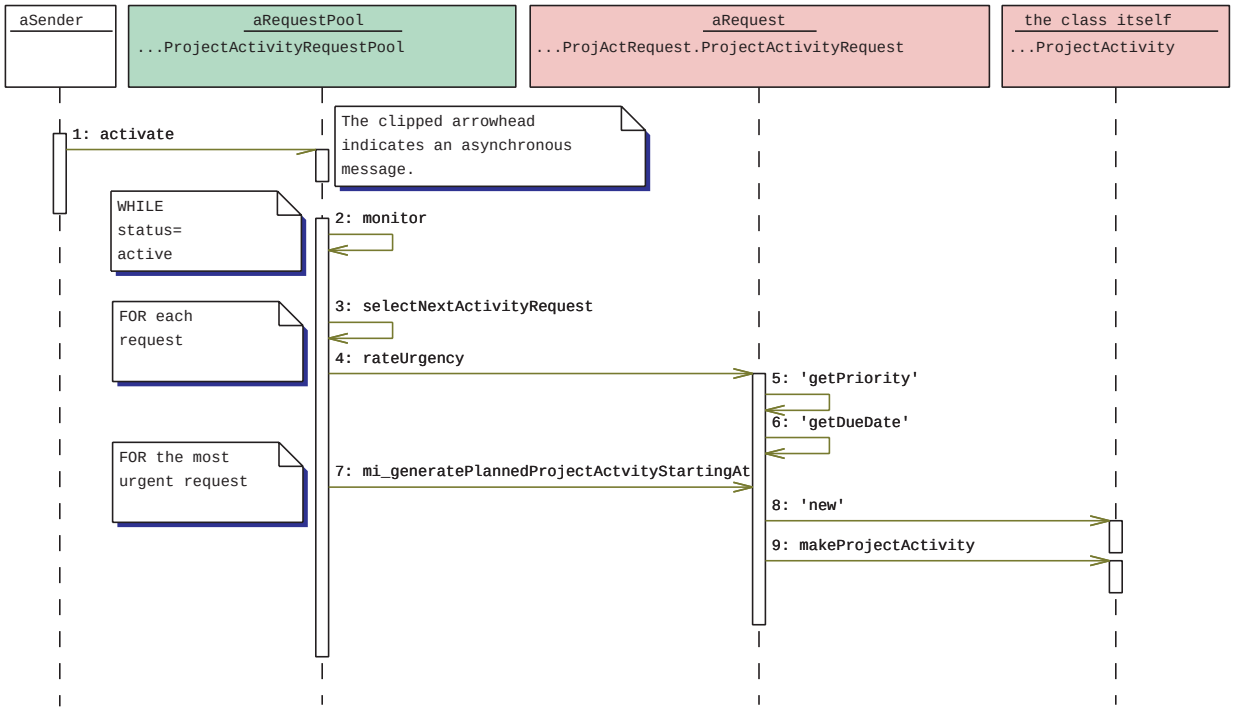

FIGURE 5-6. ▲ Activate an activity-request pool.

5.1.2 Project Activity

Guided tour. The project-activity component is shown in Figure 5-7. The project-activity component has one pink moment-interval, a project activity.

Project activity. A pink project activity links to a trio of yellow roles: activity manager, activity implementer, and activity inspector. It links to a green project account. It links to larger and smaller project activities. It also links to pink project-activity detail(s).

Also, a pink project activity links from a planned project activity to some number of actual executions of that project activity.

Tip. Plan then actual? Model with one class. Link each plan to actual(s). Label the link ends "plan 0..1" and "actual 0..*."

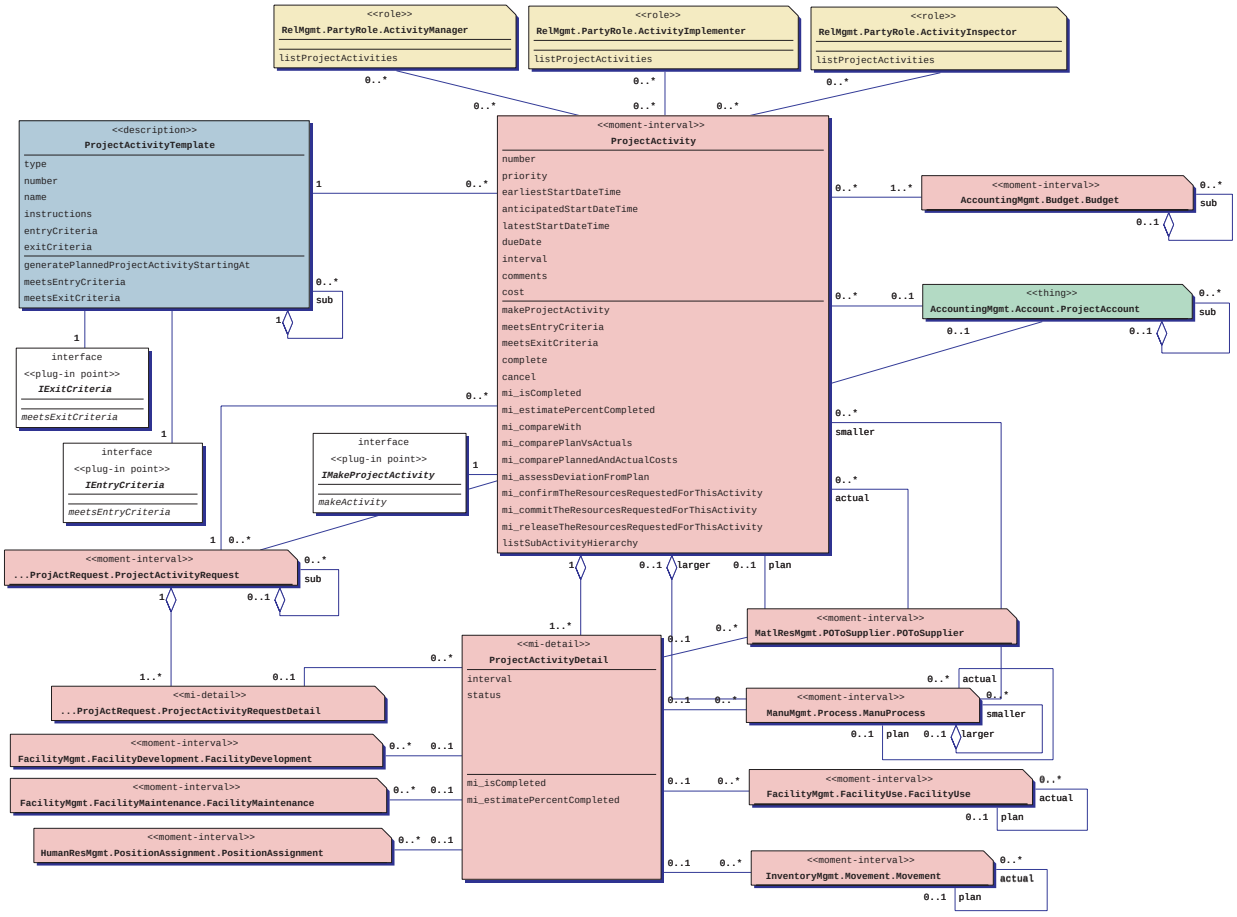

FIGURE 5-7. ▲ Project-activity component.

Project-activity detail. A pink project-activity detail specifies interval and status, along with a link to one or more of the following:

- PO to supplier
- Manufacturing process
- Facility development
- Facility use
- Facility maintenance
- Movement
- Position assignment

Before and after. For project activity, the preceding pink moment-intervals are project-activity request and budget. For project-activity detail, the preceding pink moment-interval detail is project-activity request detail. For project-activity detail, the subsequent pink moment-interval details are PO to supplier (materials management), manufacturing process (manufacturing management), facility use and facility maintenance (facility management), movement (inventory management), and position assignment (human-resource management).

Methods. Key methods include: make project activity, meets entry criteria, meets exit criteria, compare plan vs. actuals, and list sub-hierarchies.

Interactions. The "meets entry criteria" sequence is shown in Figure 5-8. A sender asks a pink project activity if it meets entry criteria. The project activity asks its blue project-activity template if the project activity meets the entry criteria. The template invokes its plug-in algorithm, asking it if it meets the entry criteria.

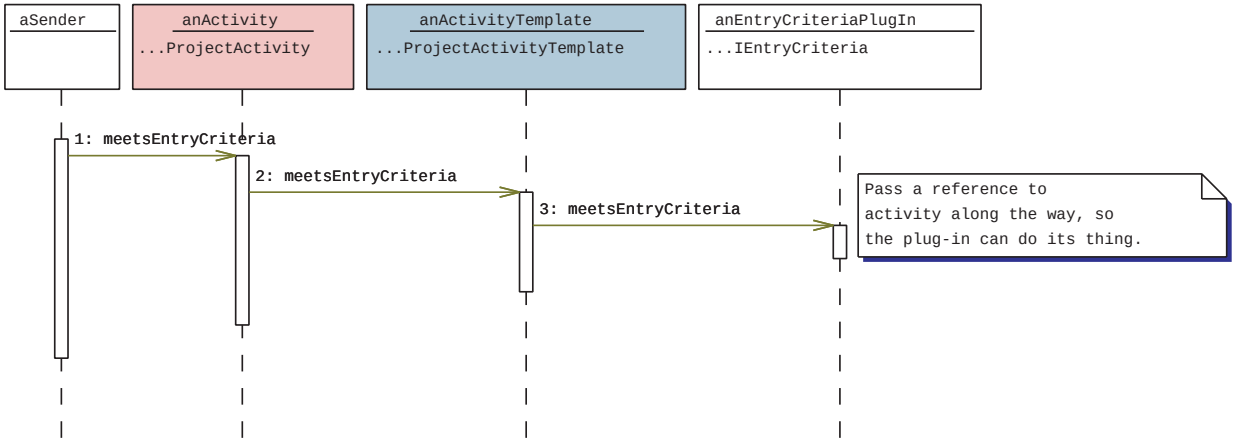

FIGURE 5-8. ▲ Meets entry criteria.

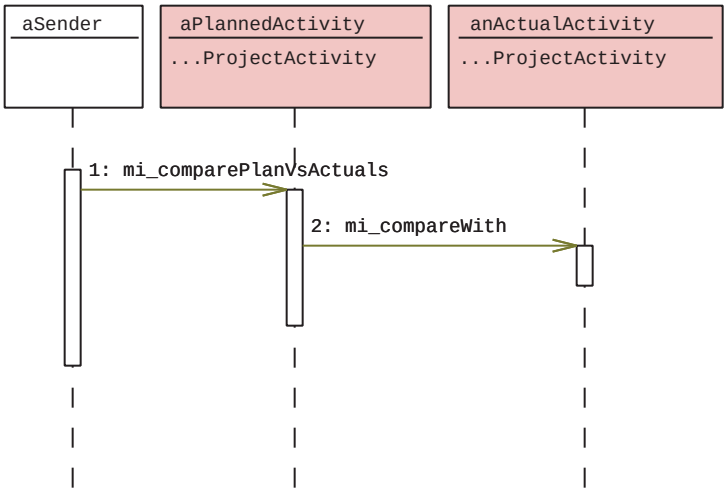

FIGURE 5-9. ▲ Compare plan vs. actuals.

The "compare plan vs. actuals" sequence is shown in Figure 5-9. A sender asks a pink planned project activity to compare the plan with its actuals. It in turn passes itself to each pink actual project activity, asking it to make a comparison. Ultimately, the result is returned to the sender.

The "list sub-hierarchies" sequence is shown in Figure 5-10. A sender asks a pink project activity to list its sub-activity hierarchy. It asks its pink

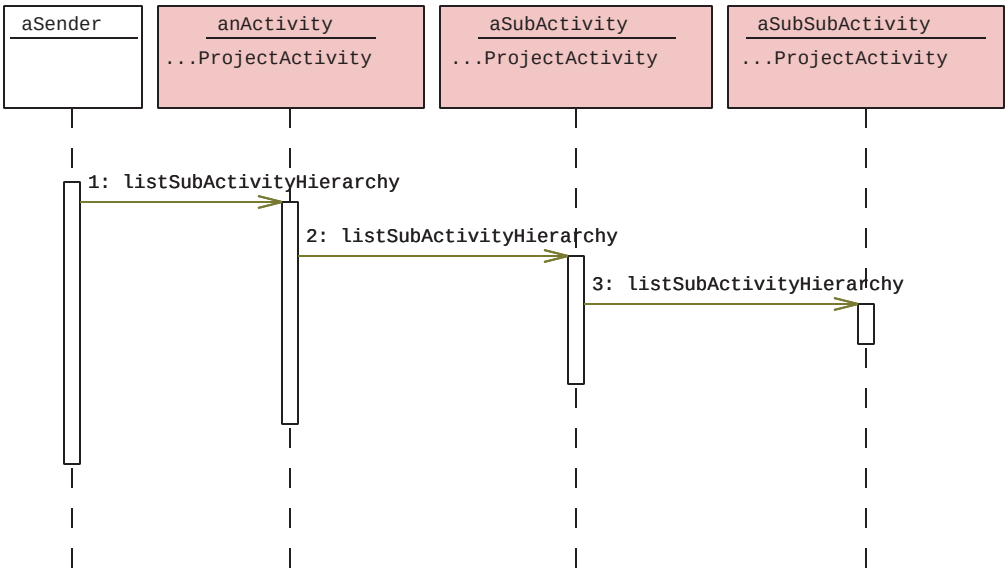

FIGURE 5-10. ▲ List sub-hierarchies.

project sub-activities to do the same. And so on. Ultimately, the result is returned to the sender.

5.1.3 Activity and Resource Pool

Guided tour. The activity-and-resource pool component is shown in Figure 5-11. The activity-and-resource pool component consists of three key green pools: an activity pool, a resource pool, and an activity-and-resource pool.

All three pools encapsulate behavior across a collection. An activity pool tracks pending, in-progress, and blocked activities. It lists activities in "importance order." A resource pool tracks on-hold and in-use resources. It lists resources in "availability order." An activity-and-resource pool provides the operational research magic, finding activity and resource allocations that work.

Methods. Key methods include: list planned project activities by priority, list resources by availability, and find project activity and resource allocations that work.

Interactions. The "find activity-and-resource allocations that work" sequence is shown in Figure 5-12. A sender asks an overall pool to find activity and resource allocations that work. An overall pool asks each of its activity pools to list planned project activities by priority; it also asks each of its resource pools to list its resources by availability. Finally, an overall pool applies some operational-research management algorithms, to come up with a list of project activity and resource allocations that will work—and returns the result to the sender.

5.2 ACCOUNTING MANAGEMENT

What. Accounting management tracks budgets, gathers accounting postings coming in from other components, and generates financial statements.

Scope. Accounting management begins with accounts and ends with accounting postings for those accounts.

Steps. First, define a chart of accounts (a list of accounts you use for tracking financial data). Second, establish accounts. Third, make budget requests. Fourth, establish budgets. Fifth, accept payments. Sixth, make accounting postings (officially record financial data).

Links. Establish a budget request and budget for a project activity (from project-activity management). Establish a budget request and budget for facility development (to facility management). Accept accounting postings (from material-resource management, facility management, manufacturing management, inventory management, product sales, accounting management, and project-activity management).

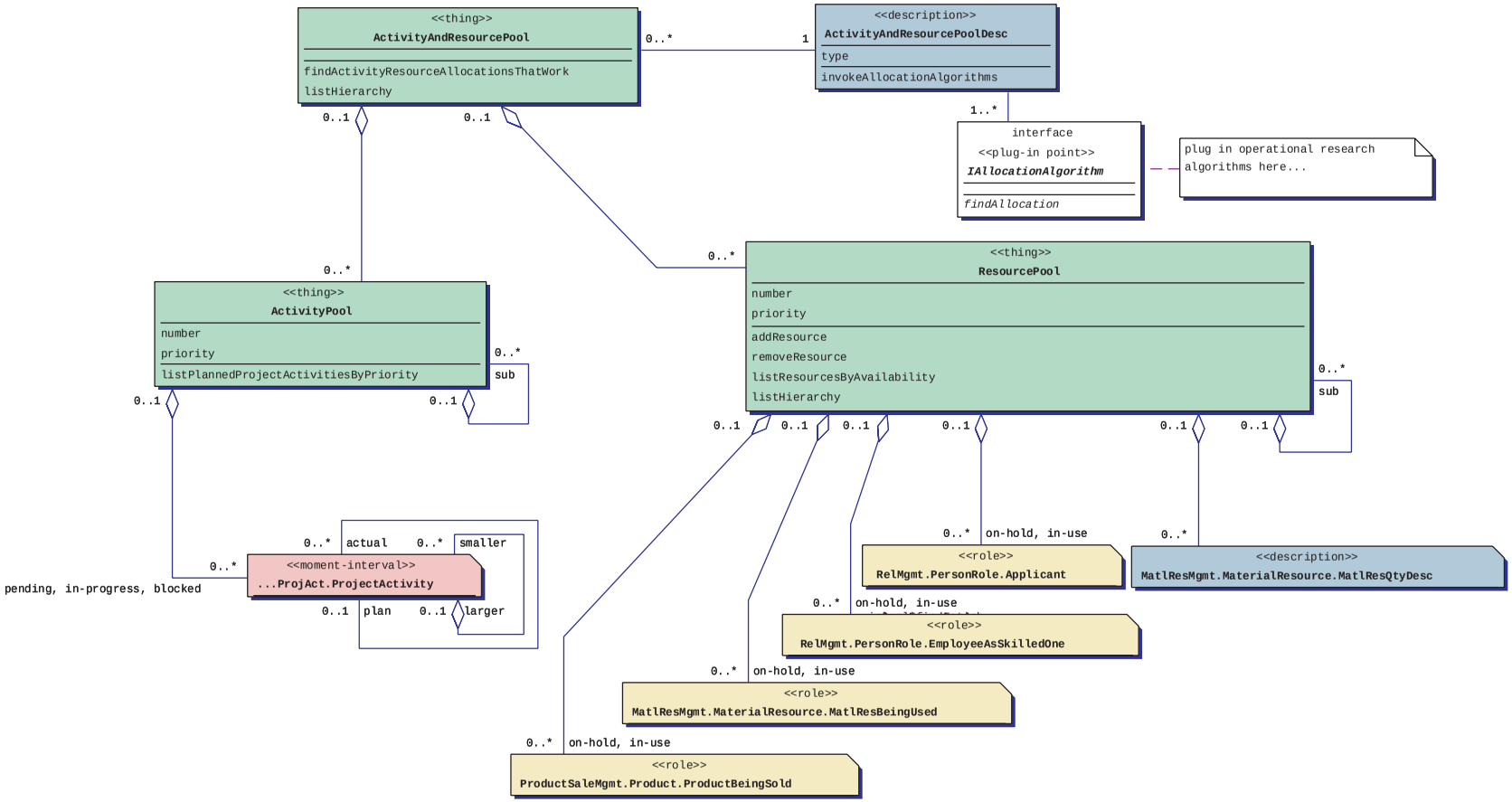

FIGURE 5-11. ▲ Activity-and-resource-pool component.

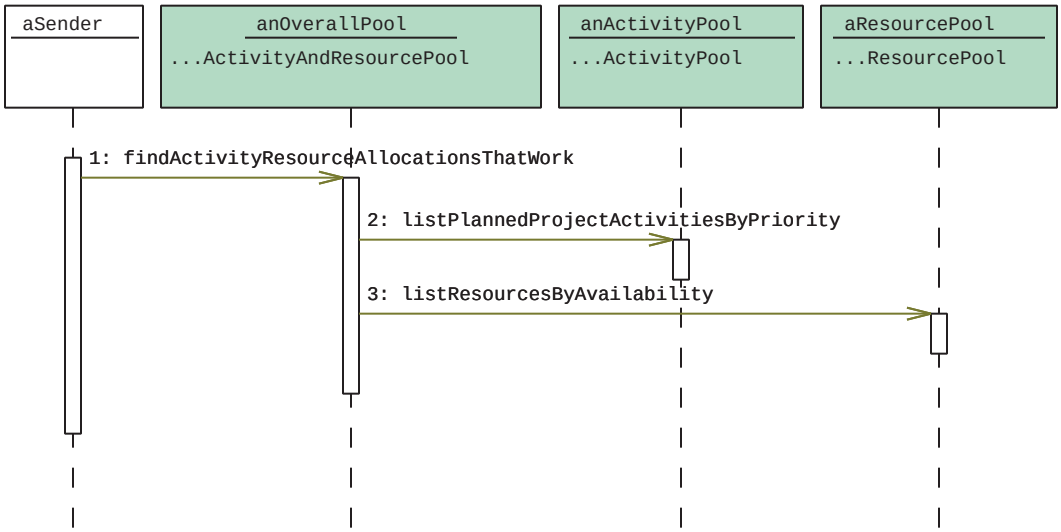

FIGURE 5-12. ▲ Find activity-and-resource allocations that work.

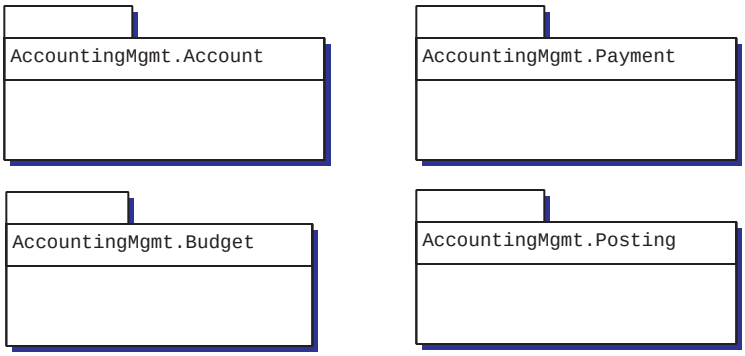

FIGURE 5-13. ▲ Accounting-management components.

Components. The components within accounting management are (Figure 5-13):

- Account
- Budget
- Payment
- Posting

Moment-intervals. The main moment-intervals for accounting management are (Figure 5-14):

- Budget request
- Budget
- Payment
- Posting

Interactions. The components work together to get things done. An example of inter-component interaction, "calculate credit postings," is shown in Figure 5-15. A sender asks a green account to calculate its credit postings. The account then iterates across its collection of postings, passing along the interval of interest as an argument. Each credit posting checks to make sure it's within the interval, then returns its amount (if within the interval) or zero (otherwise).

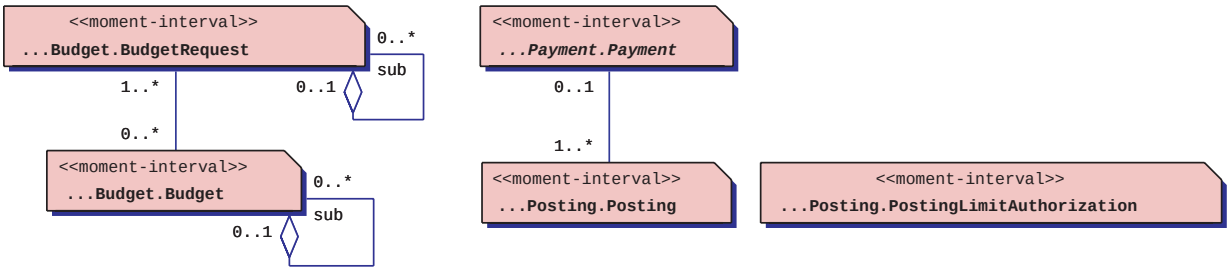

FIGURE 5-14. ▲ Summary in pink.

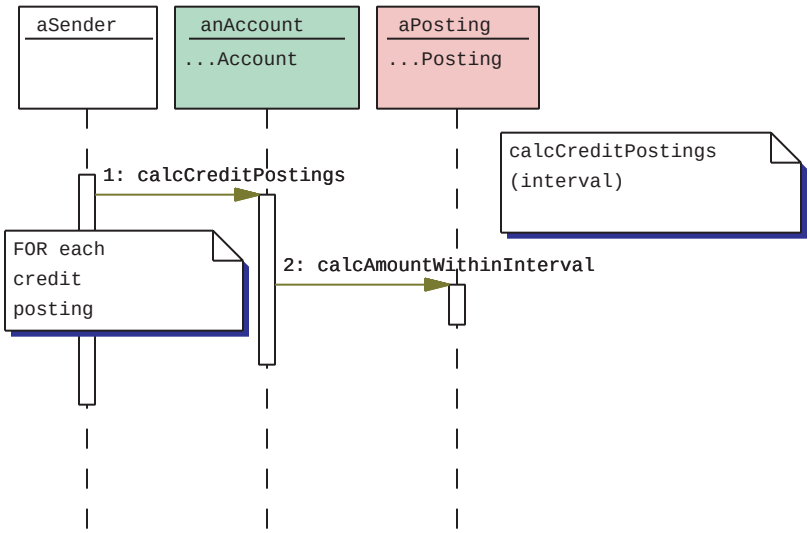

FIGURE 5-15. ▲ Calculate credit postings.

Expansion. One could expand this compound component by enhancing the model with detailed account transactions and in-depth account analyses.

5.2.1 Account

The account component consists of the various accounts needed for accounting management.

Guided tour. The account component is shown in Figure 5-16. The account component has a number of key green things: account, specializing into different kinds of accounts; general ledger; and cost center. It also tracks pink exchange rates for blue currency pair descriptions.

Account. Account links to a blue account description. In addition, account specializes into different kinds of accounts. A green *general-ledger account* links to a green cost center and a green general ledger. A green *bank account* links to a yellow bank-account holder role and a yellow bank role. A green *project account* links to its sub-accounts and to a yellow project manager (via its project). The project account also links to its pink project and project activities. A green *customer account* links to its sub-accounts and to a yellow customer-with-account role. A green *supplier account* links to its sub-accounts and to a yellow supplier-with-account role.

General ledger. A green general ledger is a collection of general-ledger accounts. It has a corresponding green chart of accounts. It also links to a yellow reporting-unit role.

Cost center. A green cost center links to a green general-ledger account and to its yellow cost-center owner.

Exchange rate. A pink exchange rate captures a buy and sell rate at a given point in time. It links to a blue currency-pair description. It also links to a yellow financial market.

Before and after. For project account, the preceding moment-interval is project. For account, the subsequent pink moment-interval is budget detail.

Methods. Key methods include: credit, debit, compare budgeted with actual, assess profitability from a general ledger.

Interactions. The "assess profitability" sequence is shown in Figure 5-17. A sender asks a green general ledger to assess its profitability. The general ledger asks each of its green general-ledger accounts to get its balance and account type. The ledger adds up the results and returns the result to the sender.

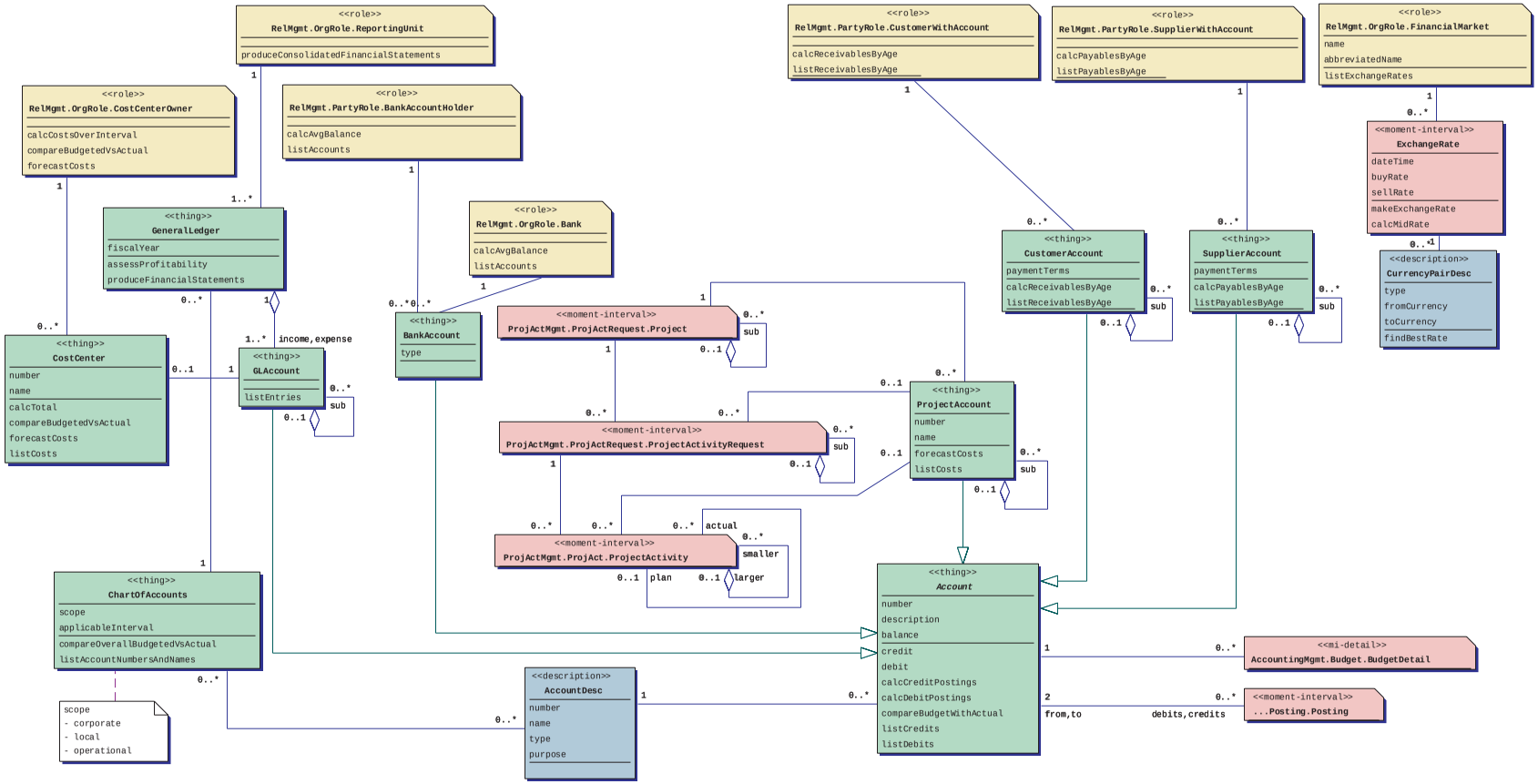

FIGURE 5-16. ▲ Account component.

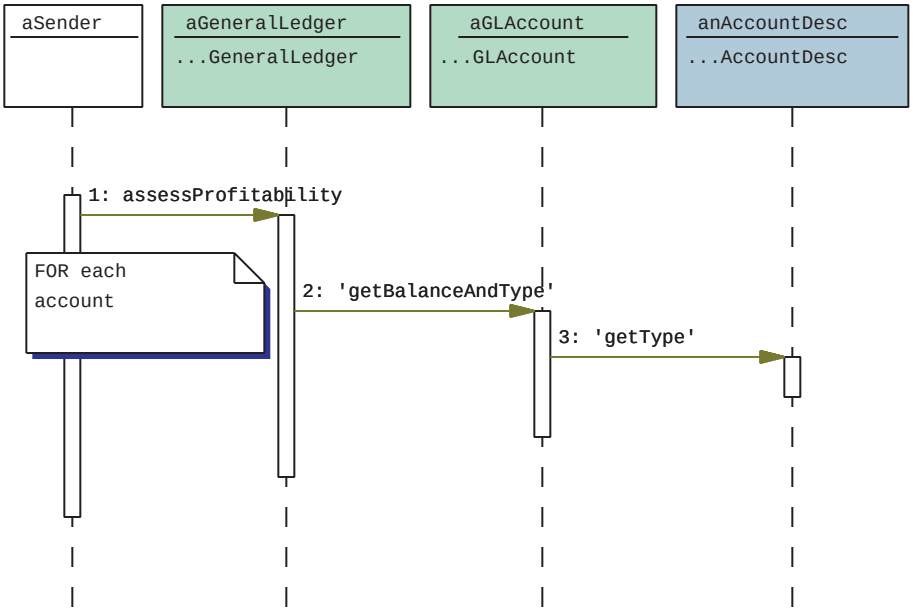

FIGURE 5-17. ▲ Assess profitability from a general ledger.

5.2.2 Budget

Guided tour. The budget component is shown in Figure 5-18. The budget component has two pink moment-intervals linked together: budget request and budget.

Budget request. A pink budget request links to two yellow roles: budget requester and budget approver. It also links to pink budget-request detail(s).

Budget-request detail. A pink budget-request detail specifies the amount requested and the amount approved. It also links to budget detail(s).

Look at the link between budget request and budget. A pink budget request might have some number of pink budgets.

Budget. A pink budget links to two yellow roles: budget requester and budget approver (both derivable). It also links to pink budget detail(s).

Budget detail. A pink budget detail specifies the amount requested and the amount approved. It also links back to a budget-request detail.

Before and after. For budget request, the preceding pink moment-interval is project-activity request. For budget, the subsequent pink moment-interval is project activity.

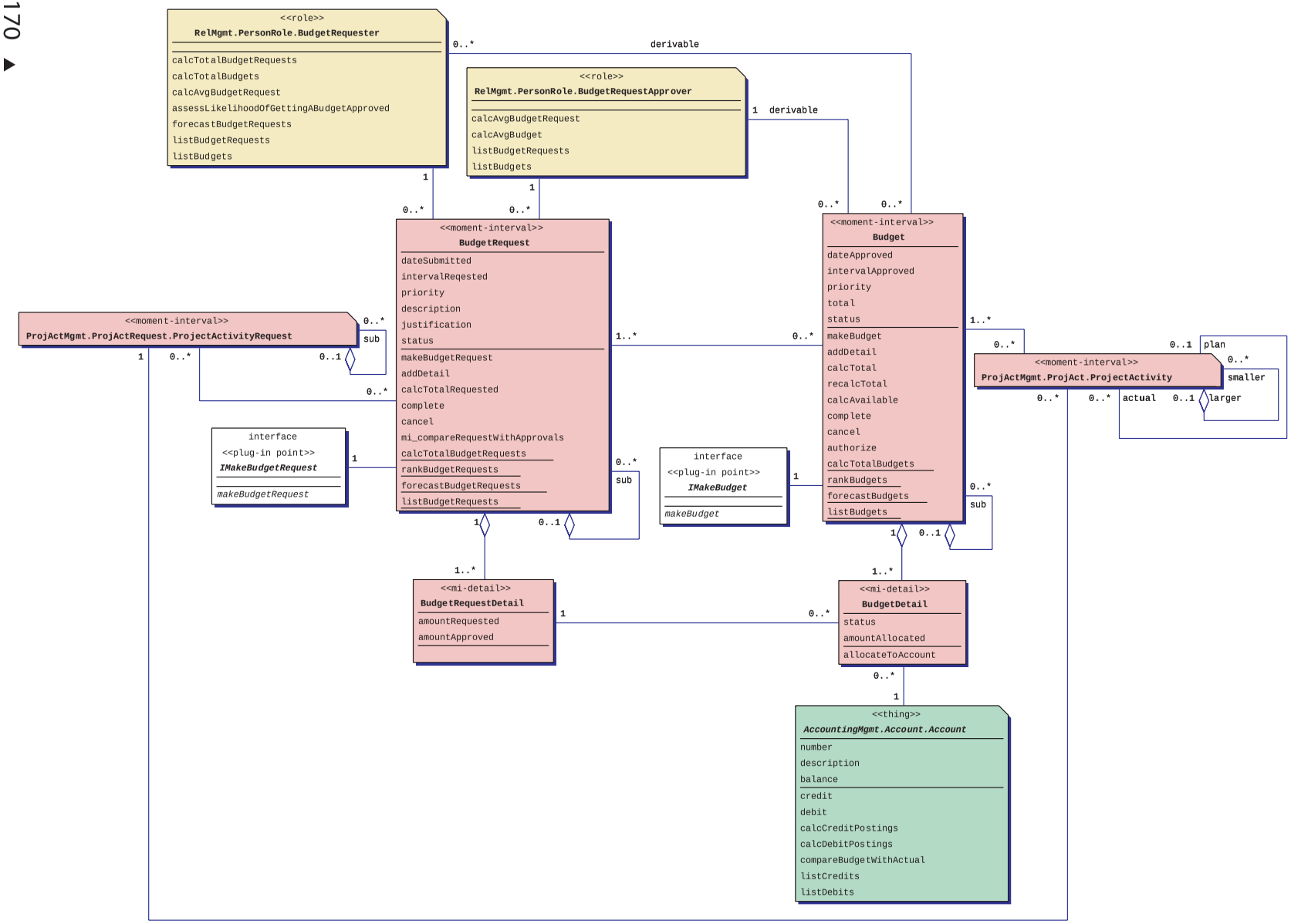

FIGURE 5-18. ▲ Budget component.

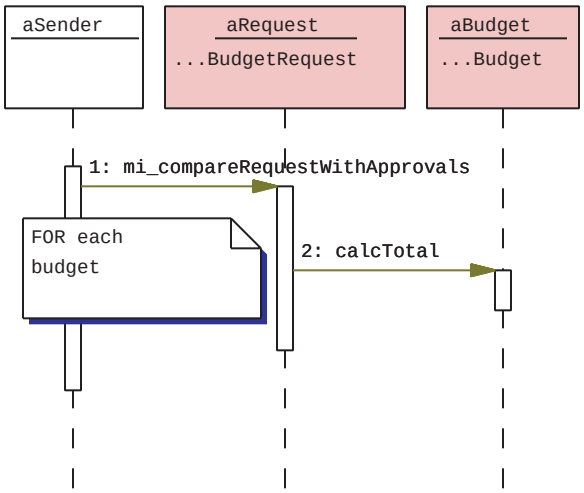

FIGURE 5-19. ▲ Compare budget request with approvals.

Methods. Key methods include: make budget request, make budget, allocate budget detail to an account, and compare budget requests with approvals.

Interactions. The "compare budget request with approvals" sequence is shown in Figure 5-19. A sender asks a pink request to compare itself with its subsequent approvals, meaning compare whether the entire request has been approved (a large request might require several incremental approvals). It asks each of its budgets to calculate its total.

5.2.3 Payment

Guided tour. The payment component is shown in Figure 5-20. The payment component has one pink moment-interval, payment. A payment can come into the business (someone pays us) or go out from the business (we pay someone else).

Payment. A pink payment links to a yellow payer. A payment comes in one of four flavors: check payment, cash payment, card payment, or electronic-funds transfer payment.

Pink check payment and card payment link to a green logical authorization system. It provides a layer of what we logically want to do with that authorization system: We ask it to authorize a payment. The logical authorization system links to a physical authorization-system proxy, a system-interaction class (shown in white) which in turn actually interacts with the other system.

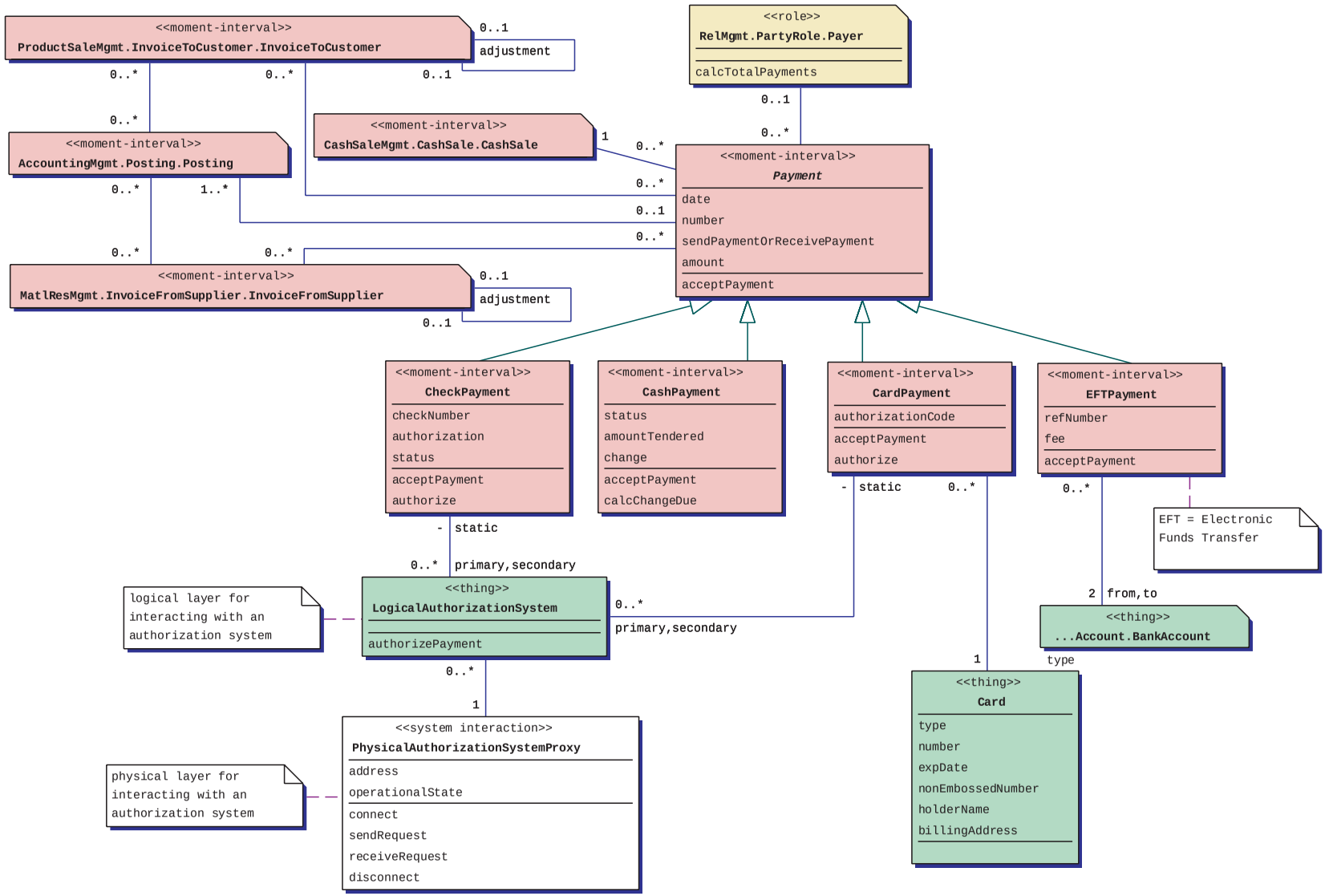

FIGURE 5-20. ▲ Payment component.

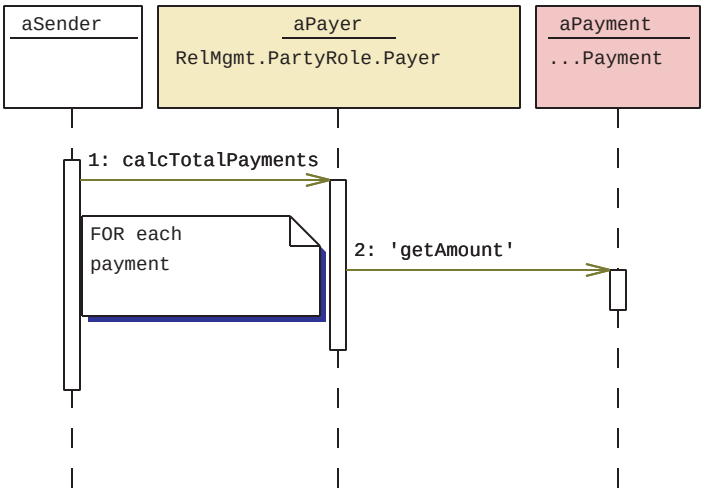

FIGURE 5-21. ▲ Calculate total payments made by a payer.

Before and after. For payment, the preceding pink moment-intervals are invoice to customer, cash sale, and invoice from supplier. The subsequent pink moment-interval is an accounting posting.

Methods. Key methods include: accept payment, authorize payment, calculate change due, and calculate total payment made by a payer.

Interactions. The "calculate total payments made by a payer" sequence is shown in Figure 5-21. A sender asks a yellow payer to calculate its total payments. It asks each of its payments for its amounts, totals the amounts, and returns the result to the sender.

5.2.4 Posting

Guided tour. The posting component is shown in Figure 5-22. The posting component has two pink moment-intervals: posting-limit authorization and posting.

Posting-limit authorization. A pink posting-limit authorization links to a yellow accountant role.

Posting. A pink posting links to a yellow accountant role. It links to a blue posting description, describing the posting category. And it links to a "from" account and a "to" account.

Before and after. For posting, the preceding pink moment-interval is a resource-consuming pink moment-interval (in another component).

Methods. Key methods include: "is authorized to post amount on date" and make a posting.

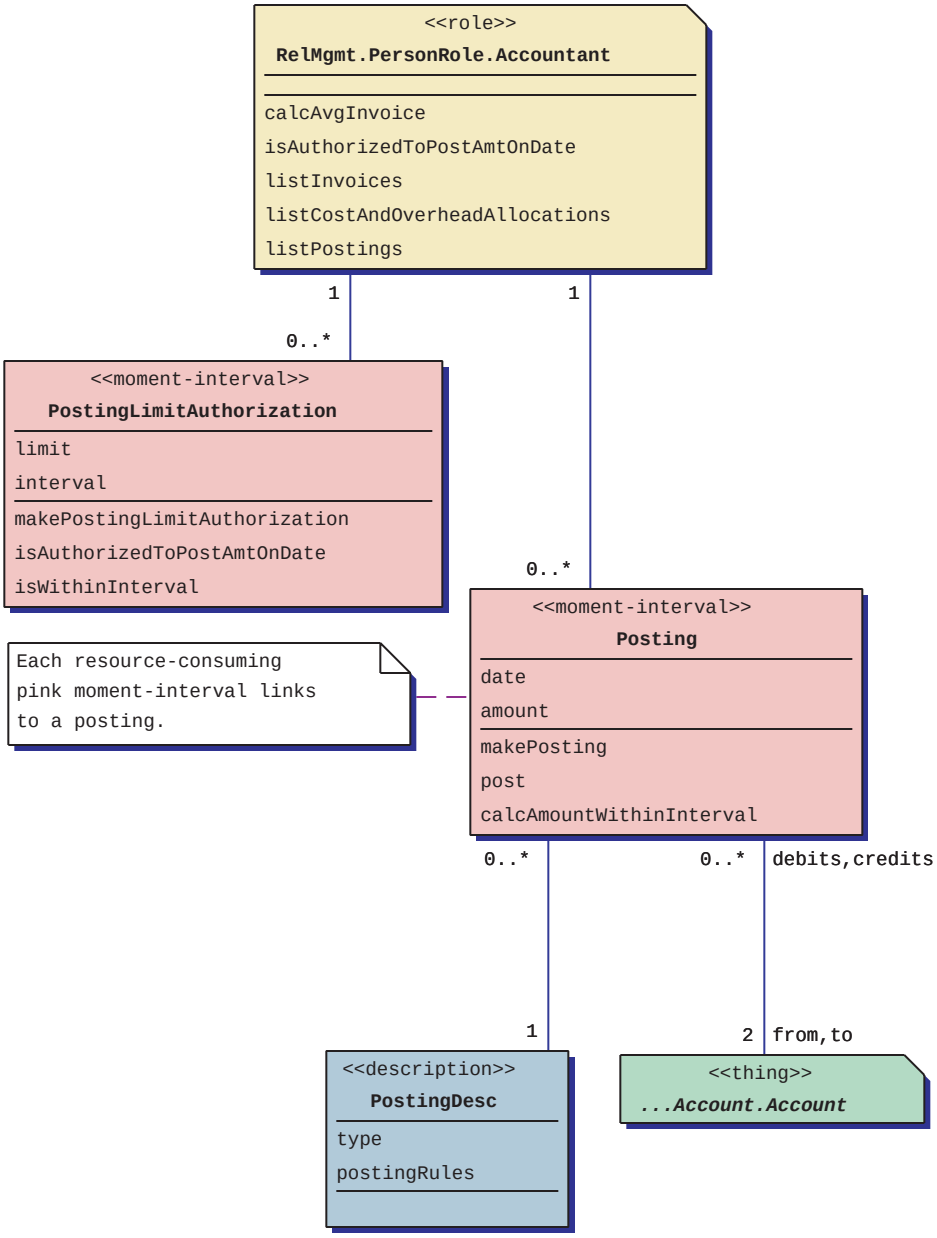

FIGURE 5-22. ▲ Posting component.

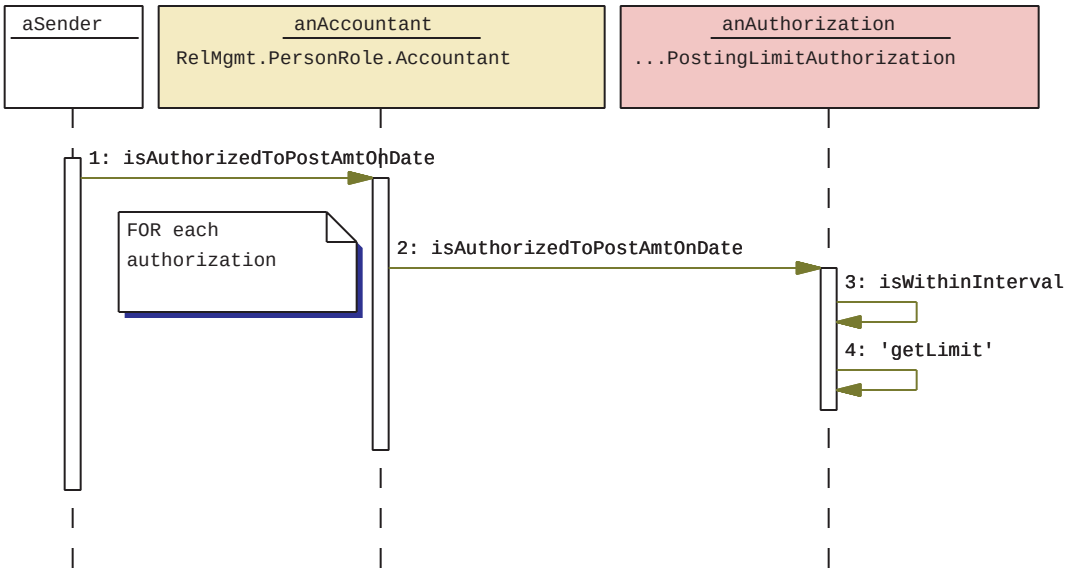

FIGURE 5-23. ▲ Is authorized to post amount on date.

Interactions. The "is authorized to post amount on date" sequence is shown in Figure 5-23. A sender asks a yellow accountant if it is authorized to post an amount on a specific date. The accountant asks each of its authorizations if it provides the needed authorization. An authorization checks if the date is within its applicable interval, gets its limits, determines whether or not it is authorized, and returns the result to accountant. Once done, the accountant object returns the result to the sender.

5.3 DOCUMENT MANAGEMENT

What. Document and record research results, business results, and legal dealings.

Scope. Document management begins with document templates and ends with document releases.

Steps. First, define a document template. Second, generate a document from a template. Third, develop document content. Fourth, log document access. Fifth, build a document. Sixth, approve or reject a document. Seventh, release a document.

Components. The components within document management are (Figure 5-24):

- Document
- Document activity

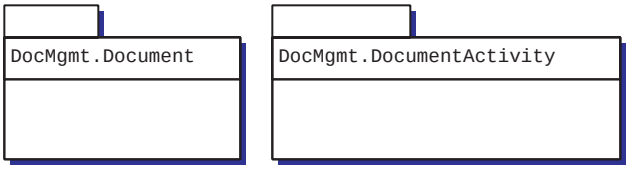

FIGURE 5-24. ▲ Document-management components.

Interactions. The components work together to get things done. An example of inter-component interaction, "build document in XML," is shown in Figure 5-25. A sender asks a green document to build an XML document. A document asks each of its parts to build an XML document (that part of the overall document). After that, a document asks the document-build class to create an object; then it sends a "make document build" message, to save the build and capture information about it.

Expansion. One could expand this component with document storage and document traceability.

5.3.1 Document

Guided tour. The document component is shown in Figure 5-26. The document component consists of blue document templates, followed by green documents.

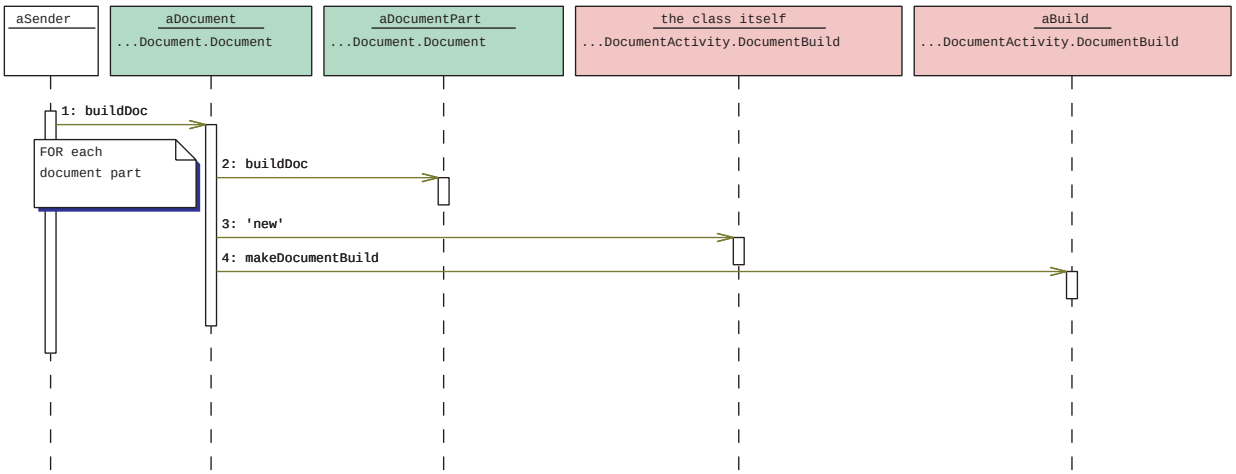

FIGURE 5-25. ▲ Build document in XML.

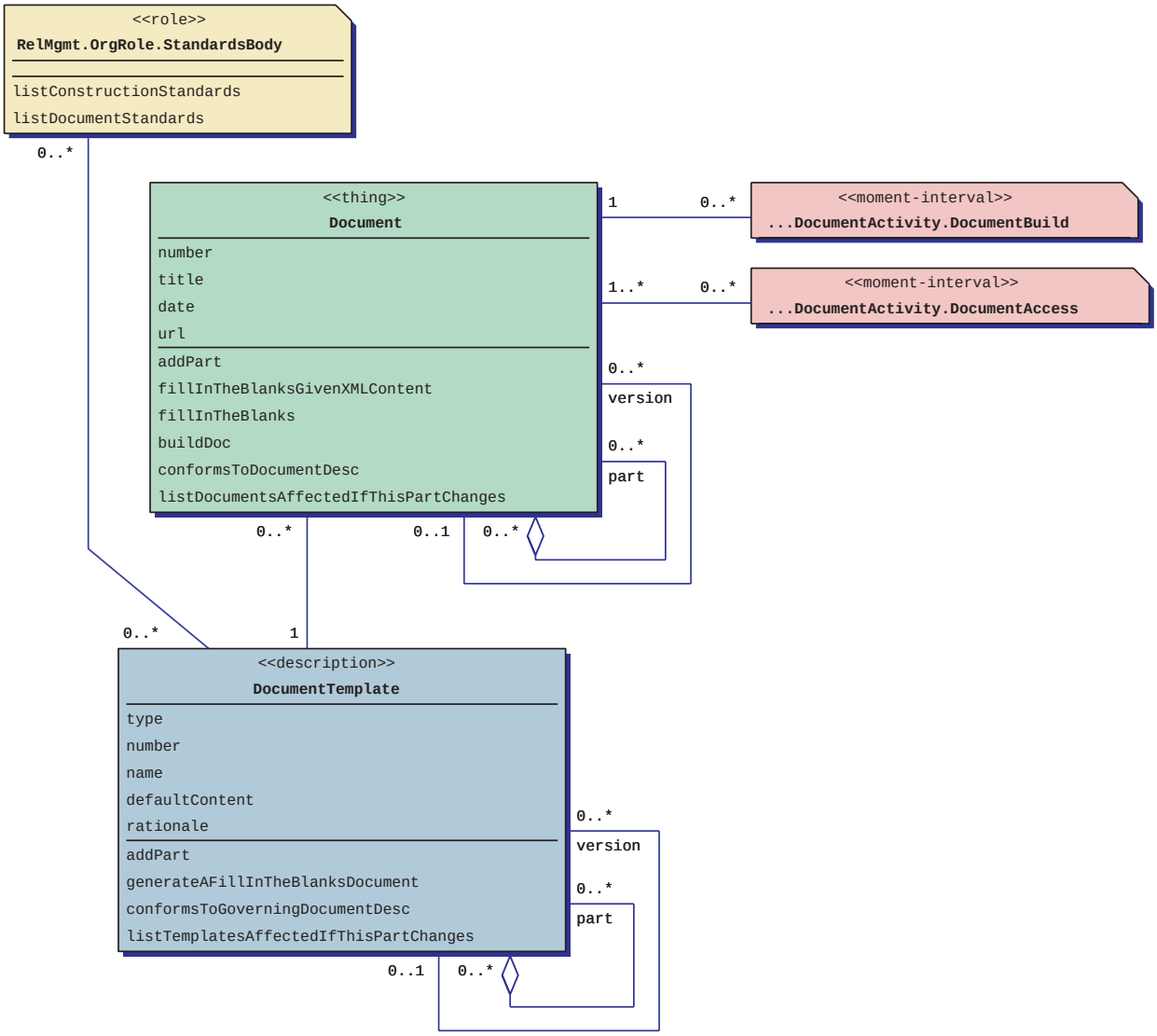

FIGURE 5-26. ▲ Document component.

Document template. A blue document template links to versions. It also consists of some number of parts.

Document. A green document links to versions. It also consists of some number of parts.

Methods. Key methods include: generate a fill-in-the-blanks document, fill in the blanks given XML content, build a document, and list documents affected if this part changes.

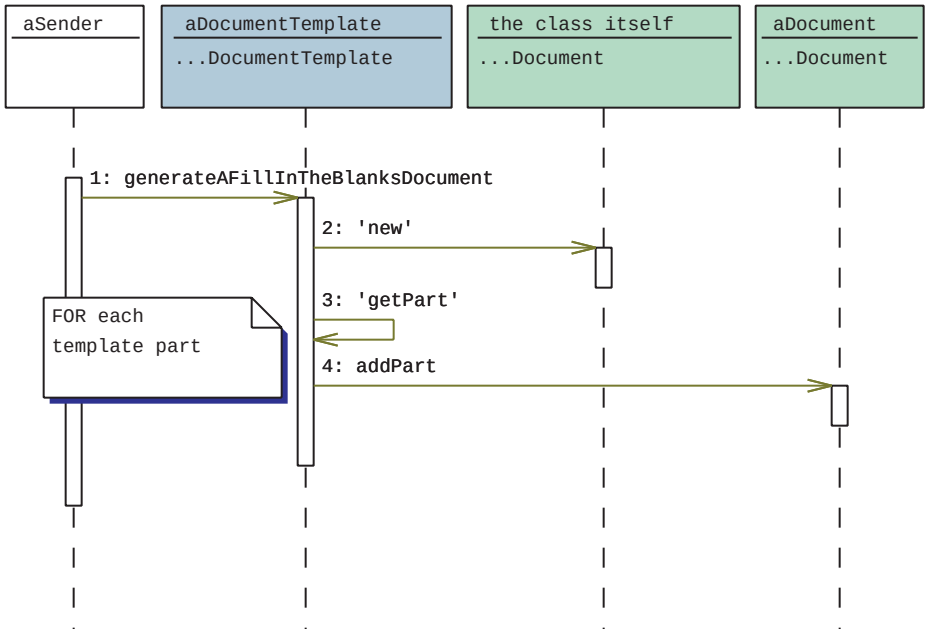

FIGURE 5-27. ▲ Generate a fill-in-the-blanks document.

Interactions. The "generate a fill-in-the-blanks document" sequence is shown in Figure 5-27. A sender asks a blue document template to generate a fill-in-the-blanks document. The template sends a message to the document class, to create a document. Then the template gets template parts and asks the document to add document parts.

The "fill in the blanks given XML content" sequence is shown in Figure 5-28. A sender asks a green document to fill in the blanks, given XML content. It fills in its own blanks. And it asks its document parts to fill in its blanks, too.

5.3.2 Document Activity

Guided tour. The document-activity component is shown in Figure 5-29. The document-activity component has four pink moment-intervals, linked together: document build, document approval, document release, and document access.

These four moment-intervals track the progression from a build to some number of approvals to some number of releases to some number of document accesses. If for a build there is always just one approval and just one release, then the three subsequent moments in time can be more simply modeled as attributes within the build class (date built, date approved, date rejected, and date released).

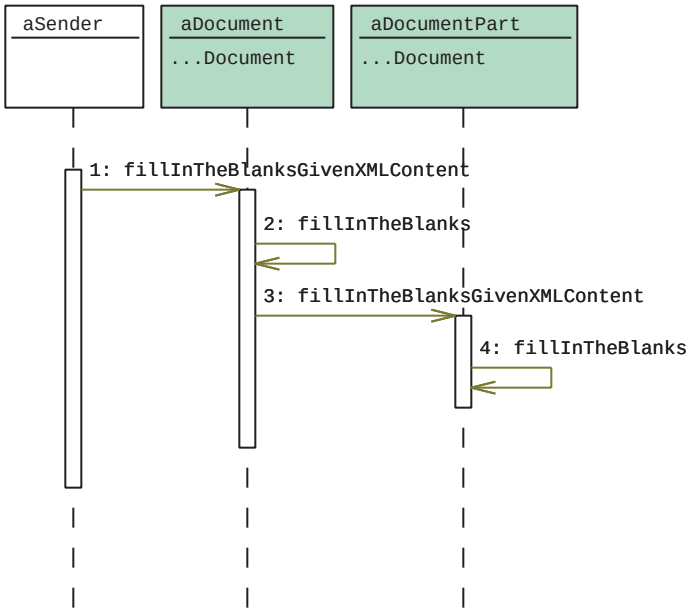

FIGURE 5-28. ▲ Fill in the blanks given XML content.

A pink document approval links to a yellow document approver. A pink document access links to a yellow document accesser and to a green document.

Tip. A pink moment-interval object with at most one corresponding subsequent moment-interval object? Consider merging the two, resulting in a simpler overall model.

Methods. Key methods include: make document access/build/approval/release, and generate document approval/release.

Interactions. The "generate document release" sequence is shown in Figure 5-30. A sender asks a pink document approval to generate a document release. It asks the document release class to create an object. Then it sends a message to that object, asking it to make a document release.

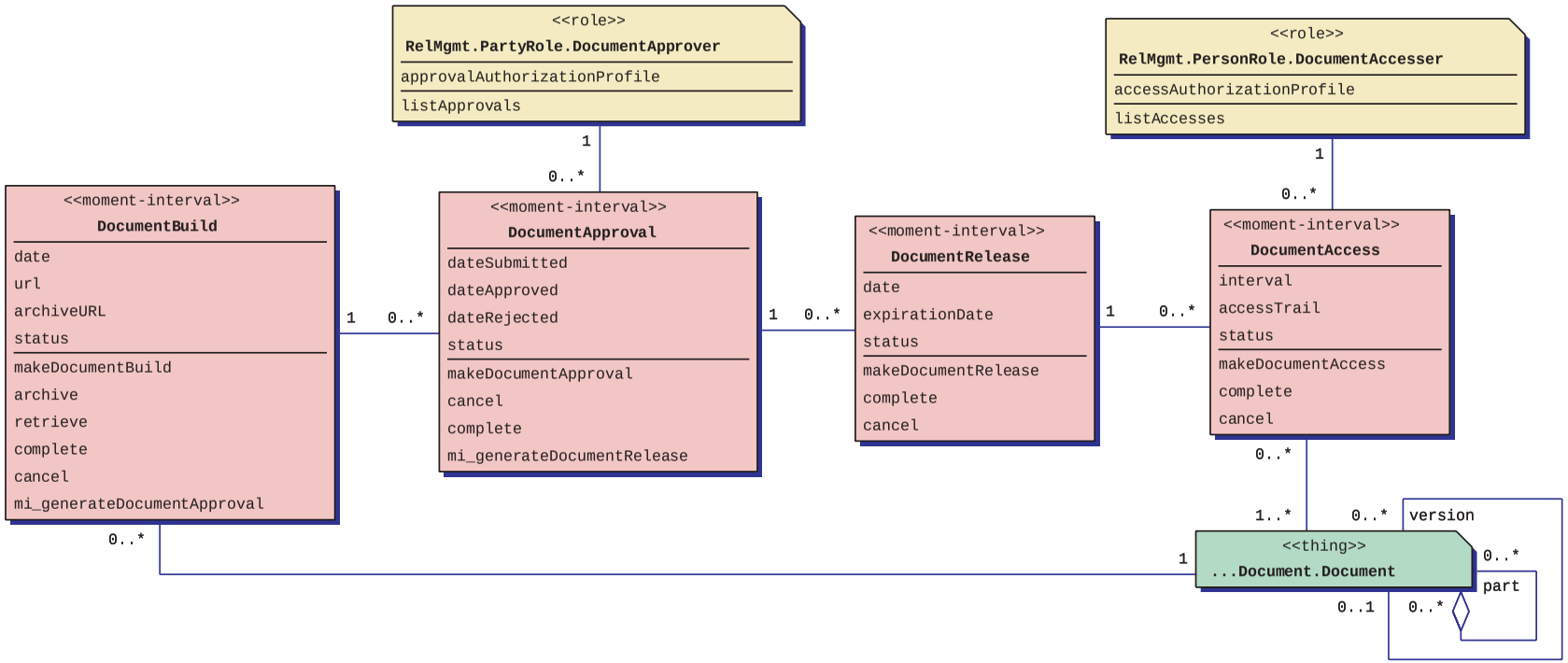

FIGURE 5-29. ▲ Document-activity component.

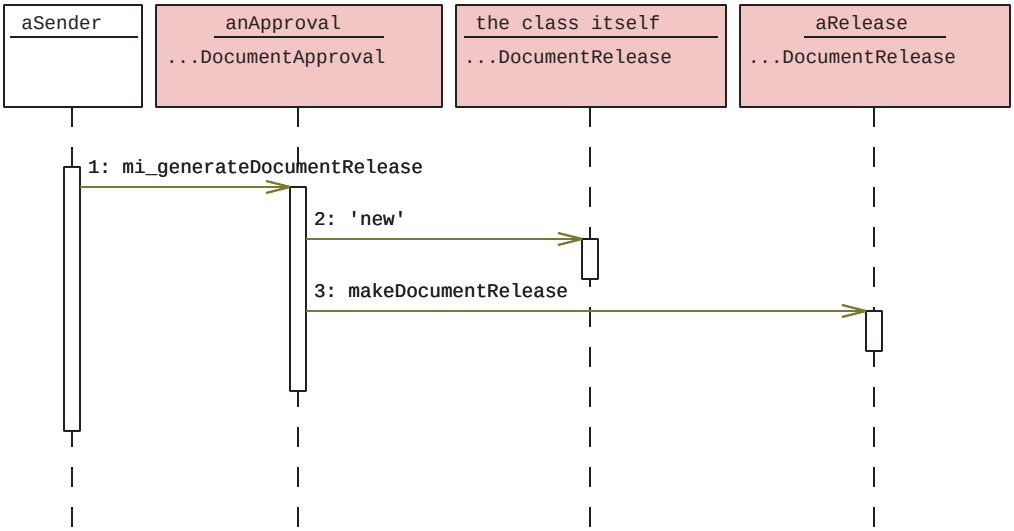

FIGURE 5-30. ▲ Generate document release.