ICEACE Reference Manual

Bulent Ozel - bulent.ozel@gmail.com

May 5, 2013

Contents

1 ICEACE FLAME Implementation

1.1 firm

Table 1: **List of memory variables for firm agent.**

Name	Description
int id	Agent ID.
int isconstructor	Identifies if the firm is a constractor firm or not.
int day_of_month_to_act	The day of the month to act at production and labour.
int day_of_week_to_act	Day of the week to act for consumption.
int_array employees	Holds employee ids
double wage_offer	Monthly wage offer.
int no_employees	Number of employees
int vacancies	Number of vacancies
int employees_needed	Number of workers a firm needs for next production
int day_of_month_wages_paid	The day of the month wages paid.
double labour_productivity	Productivity of a unit labour.
int production_current	Total number of goods produced in current month.
int production_estimate	An estimate of production for incoming period.
int production_plan	Production plan for next month.
double unit_goods_price	Price of a unit of goods produced by a firm.
int day_of_month_production_completed	The day of the month amount of production is computed.
double unit_house_price	Unit price of an house.
double labour_productivity_construction	Productivity of a unit labour in construction sector.
double capital_productivity_construction	Capital productivity in construction sector.
double capital_construction	Upper amount of constraction capital in housing.
int projects	Holds projects under construction. Indices denote number of months left for completion.
double debt	Total debt of the firm.
int inventory	Unsold inventory from previous month.
int sales	Total number of sales within a month.
double revenue	Total revenue from sales. It is offset quarterly.
double costs	Total production and operation costs.

Table 1 – continued from previous page

Name	Description
double equity	Firm equity.
double liquidity	Liquidity.
double capital_goods	Capital Goods.

Table 2: **List of functions for firm agent.**

Name	Description
firm_init	Notifies its id.
idle	It is not the day of the week to sell.
firm_consumption_supply	A firm ships its goods to malls.
firm_consumption_recieve_sales	A firm recieves goods unsold and sales liquidity from the mall.
idle	Labour hiring is not active.
firm_labour_workforce_needed	The firm computes required number of employees needed for incoming month.
idle	Firm does nothing
firm_labour_fire	The firm decides to fire if employee needed is below number of employees it does have.
firm_labour_job_announcement_stage1	The agent posts available positions.
firm_labour_job_offer_stage1	The agent takes job matches done by jpoffice.
firm_labour_update	The agent updates labour status. In case of resignments.
firm_labour_job_announcement_stage2	The agent posts unfilled positions.
idle	The agent has no vacant positions
firm_labour_job_offer_stage2	The agent completes the job placement.
idle	Does nothing at the point when it is not last day of the month.
firm_labour_pay_wages	Pay wages and update liquidity.
idle	It is not the end of month or the first day of the month.
idle	The state serves to differentiate regualar and constructor firms.
idle	Sets a producer role.
idle	Set the constructor role.
firm_production_produce_goods	Firm audits number of items produced. Updates inventory accordingly.

Table 2 – continued from previous page

Name	Description
firm_production_set_price	Firm sets price of goods produced.
firm_production_plan	Firm determines number of items to be produced for the next period.
firm_production_compute_labour_demand	Firm determines required number of labourers for current production plan.
firm_production_construct_houses	Firm releases number of items produced. Updates project status accordingly.
firm_production_construction_plan	Firm sets the construction project plan.
firm_production_construction_labour_demand	Firm determines required number of labourers for current construction plan.
idle	It is not the end/start of a quarter.
firm_accounting_distribute_net_profit	At the end of a quarter, a firm sends net profit to the equity fund.
firm_accounting_do_balance_sheet	Updating the balance sheet.

1.2 household

Table 3: **List of memory variables for household agent.**

Name	Description
int id	Agent ID.
int day_of_week_to_act	Day of the week to act for consumption.
double weekly_consumption_budget	Regualr weekly consumption budget computed for the quarter.
double consumption_budget	Consumption budget that can be spent for the week.
int my_employer_id	Employer ID of an household. A 0 means unemployed.
double wage	Current wage earned.
int day_of_month_to_act	The day of the month to act for seeking a job.
int day_of_month_wage_recieved	The day of the month to wage recieved.
double mortgages	Total mortgage.
double housing_payment	Holds total mortgage payment done within the last quarter.
double equity	Household equity.
double housing_price	Market value of a unit housing.
int housing_units	Number of housing units owned by a household.
int dividends	Number of dividends an household owns.

Table 3 – continued from previous page

Name	Description
double liquidity	Liquidity.
double fund_shares	Equity fund shares.
int previous_wages	Holds wages earned in three previous months.

Table 4: **List of functions for household agent.**

Name	Description
household_init	Notifies its id..
idle	It is not the first day of the month to compute monthly consumption.
household_consumption_monthly_budget	It is the first day of the month, time to compute monthly consumption.
idle	It is not the day of the week to shop.
household_consumption_demand	A household demands a consumption amounted to the available budget he/she has.
household_consumption_recieve_goods	A household recieves goods bought from the mall.
idle	Job searching is not active.
household_labour_check_fired	Household checks layout status.
household_labour_reemployment_application	Stage 01 of job applications. Already employed households apply with a turnover probability
idle	Stage 01 of job applications. Unemployed households skip this stage
household_labour_turnover	A job turnover.
household_labour_employment_application	Stage 02 of job market. Unemployed households apply.
household_labour_employment	A new employment.
idle	Does nothing at the point when it is not last day of the month.
household_labour_recieve_wage	Recieves payment and update wage history.
idle	It is not the start of a new quarter.
idle	It is the start of a new quarter.
idle	The household does not own any shares of firms.
household_accounting_collect_shares	At the end of a quarter household recieves shares from the firms via Equity Fund.
household_accounting_do_balance_sheet	Computing the balance sheet.

1.3 equityfund

Table 5: **List of memory variables for equityfund agent.**

Name	Description
int id	Agent ID.
double share_firms	Shares owned by regular firms.
double share_construction_firms	Shares owned by constructor firms.
double share_banks	Shares owned by banks.
double equity	Firm equity.
double liquidity	Liquidity.
int n_dividends	Number of households to recieve liquid shares from firm net income.

Table 6: **List of functions for equityfund agent.**

Name	Description
equityfund_init	Notifies its id.
idle	It is not the end/start of a quarter.
equityfund_accounting_collect_firm_shares	At the end of a quarter collect net income from the firms in the market.
equityfund_accounting_distribute_shares	At the end of a quarter net income per household is distributed.
equityfund_accounting_do_balance_sheet	Equity fund balance sheet accounting activities.

1.4 bank

Table 7: **List of memory variables for bank agent.**

Name	Description
int id	Agent ID.
double loans	loans to firms.
double mortgages	Mortgages to households.
double deposits	Deposits recieved from private sector.
double debt	Debt to central bank.
double equity	Firm equity.

Table 7 – continued from previous page

Name	Description
double liquidity	Liquidity.

Table 8: **List of functions for bank agent.**

Name	Description
bank_init	Notifies its id.
idle	It is not the end/start of a quarter.
bank_accounting_do_balance_ sheet	Bank balance sheet accounting activities.

1.5   government

Table 9: **List of memory variables for government agent.**

Name	Description
int id	Agent ID.
double debt	Debt to central bank.
double equity	Government equity.
double liquidity	Government liquidity.

Table 10: **List of functions for government agent.**

Name	Description
government_init	Notifies its id.
idle	It is not the end/start of a quarter.
government_accounting_do_ balance_sheet	Government balance sheet accounting activities.

1.6   centralbank

Table 11: **List of memory variables for centralbank agent.**

Name	Description

Table 11 – continued from previous page

Name	Description
int id	Agent ID.
double liquidity	Central Bank liquidity
double loans_banks	loans to firms.
double loans_government	loans to the government.
double fiat_money	Outstanding fiat money.
double equity	Firm equity.
double liquidity_banks	Liquidity kept for banks.
double liquidity_government	Liquidity kept for the government.

Table 12: **List of functions for centralbank agent.**

Name	Description
centralbank_init	Notifies its id.
idle	It is not the end/start of a quarter.
centralbank_accounting_do_balance_sheet	Central Bank balance sheet accounting activities.

1.7 jpoffice

Table 13: **List of memory variables for jpoffice agent.**

Name	Description
int id	Agent ID.
int day_of_month_to_act	The day of mont to perform job matching.

Table 14: **List of functions for jpoffice agent.**

Name	Description
jpoffice_init	Notifies its id.
idle	Job matching is not active.
jpoffice_labour_stage1	Collecting vacancies and job applications. Vacancies and turnover applications are matched.
jpoffice_labour_stage2	Second stage job matching.

1.8 mall

Table 15: **List of memory variables for mall agent.**

Name	Description
int id	Agent ID.
int day_of_week_to_act	Day of the week to act for consumption.

Table 16: **List of functions for mall agent.**

Name	Description
mall_init	Notifies its id.
idle	It is not the day of the week to shop.
mall_consumption_shopping	Mall collecting supplies from the firms, demands from the households.

1.9 Messages

See Table 17.

Table 17: **List of messages.**

Name	Description
buy	Weekly household consumption information.
int id	Household agent ID.
double budget	Amount of liquid money to spend.
bought	Consumption summary.
int id	Household agent ID.
double money_left	Amount of liquid money that was not spent.
int recieved_quantity	Number of goods bought.
sell	Information on items to be sold at the mall.
int id	Firm agent ID.
double price	Unit price of goods to be sold.
int inventory	Number of items to be sold.
sold	Sales summary.
int id	Firm agent ID.
int unsold_quantities	Number of unsold quantities.
fired	Sent by a firm to notify an employee who is fired.
int employee_id	Employee ID who has been fired.
vacancy_stage1	Sent by a Firm to post a vacancy.
int employer_id	Firm agent ID who posts a new position.

Continued on next page

Table 17 – continued from previous page

Name	Description
double wage	Amount of salary to be offered.
job_application_stage2	Sent by an household to apply a posted vacancy.
int employee_id	Household agent ID who seeks employment.
job_application_stage1	Sent by an household to notifie jpoffice
int employee_id	Household agent ID who applies for a new job.
double wage	Current amount of wage earned by the applicant.
job_match_stage1	Sent by a firm informing a filled position.
int employer_id	Firm agent ID that has filled a post.
int employee_id	Household agent ID who has been offered a position.
double wage	Amount of salary that is offered.
job_change	Sent by a worker to notify a resigned position.
int employer_id	Firm agent ID of the position held.
int employee_id	Household aent ID who is changing the job.
vacancy_stage2	Sent by a Firm to post unfilled vacancy.
int employer_id	Firm agent ID who posts unfilled position.
double wage	Amount of salary to be offered.
job_match_stage2	Sent by a firm informing a filled position.
int employer_id	Firm agent ID that has filled a post.
int employee_id	Household agent ID who has been offered a position.
double wage	Amount of salary that is offered.
firm_net_profit	Net income send to Equity Fund.
int id	Firm agent ID.
int isconstructor	Flag to label whether the income is recieved from a constructor firm.
double net_income	Net income to be distributed.
household_share	Shares are sent to households.
double amount	Share per household.

1.10 Constants

Table 18: **List of constants.**

Name	Description
double ratio_liquidity	Ratio of liquidity to monthly disposable income.
double consumption_adjustment_speed	The consumption adjustment speed.
double wealth_effect	A rate of influence from housing market to regular economy. Used by Household agents.
double turnover_probability	A probability of a uniform distribution that determines turnover rate.
double production_markup	Rate of increase in production by firms.
double price_markup	Rate of increase set by firms on prices.

Table 18 – continued from previous page

Name	Description
double firm_memory_persistance	A parameter holding to what extend firms previous sale history play on final production decision.
double ratio_debt_firm	Ratio of debt to be paid by a firm.
double ratio_capitalist_households	It is the rate of households owning firm shares.

1.11 Datatypes

Table 19: **List of attributes for ADTs.**

Name	Description
buyer	Consumer data.
int id	Id of the household agent.
double budget	Consumption budget to go.
int recieved_quantity	Number of items bought.
seller	Seller data.
int id	Id of the firm agent.
double price	Unit price of goods to be sold.
int inventory	Number of items available for sale.
vacancy	Firm vacancy information.
int id	Id of the firm agent.
double wage	Wage offered by the firm that holds the vacancy.
employee	Job applicant data.
int id	Id of the household agent.
double wage	Current wage of the job applicant.