

Tax Code to Factgraph

// 20230727 // Shimona Carvalho

Calculations in Tax Code

HOW IS AGI CALCULATED?

$$\text{GROSS INCOME} - \text{DEDUCTIONS} = \text{AGI}$$

GROSS INCOME

- Your main employment
- Side gigs or independent contract work
- Real estate
- Unemployment benefits
- Investments
- Social Security
- Pensions

DEDUCTIONS

- Student loan interest
- Certain tuition and fees
- Health Savings Account contributions
- Traditional IRA contributions
- Self-employment taxes
- Certain business expenses
- Alimony
- Qualified educator expenses

AGI represented in FactGraph

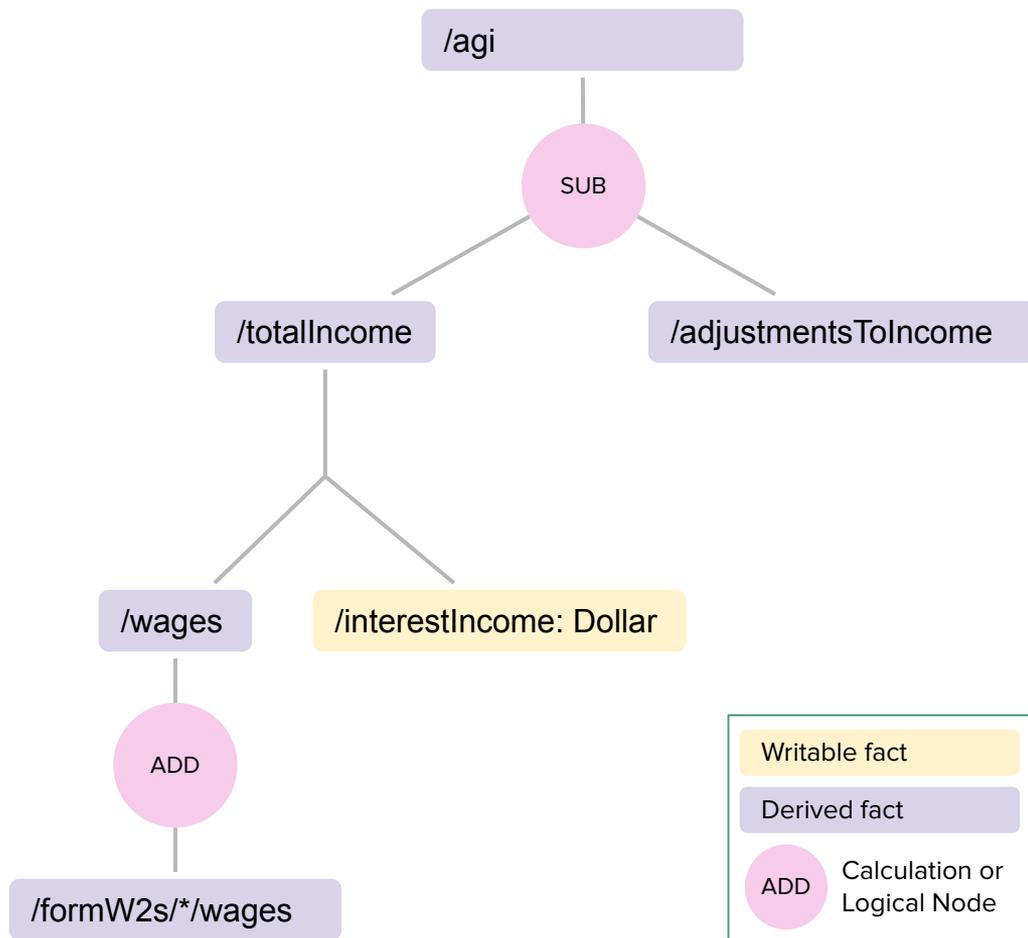
The FactGraph is a human generated representation of the tax code.

It's stored in ty2022.xml

AGI portion represented here.

- Yellow nodes are writable facts
- Purple nodes are derived facts

Information travels up the tree, computing the “derived facts” as “writable facts” are filled in.



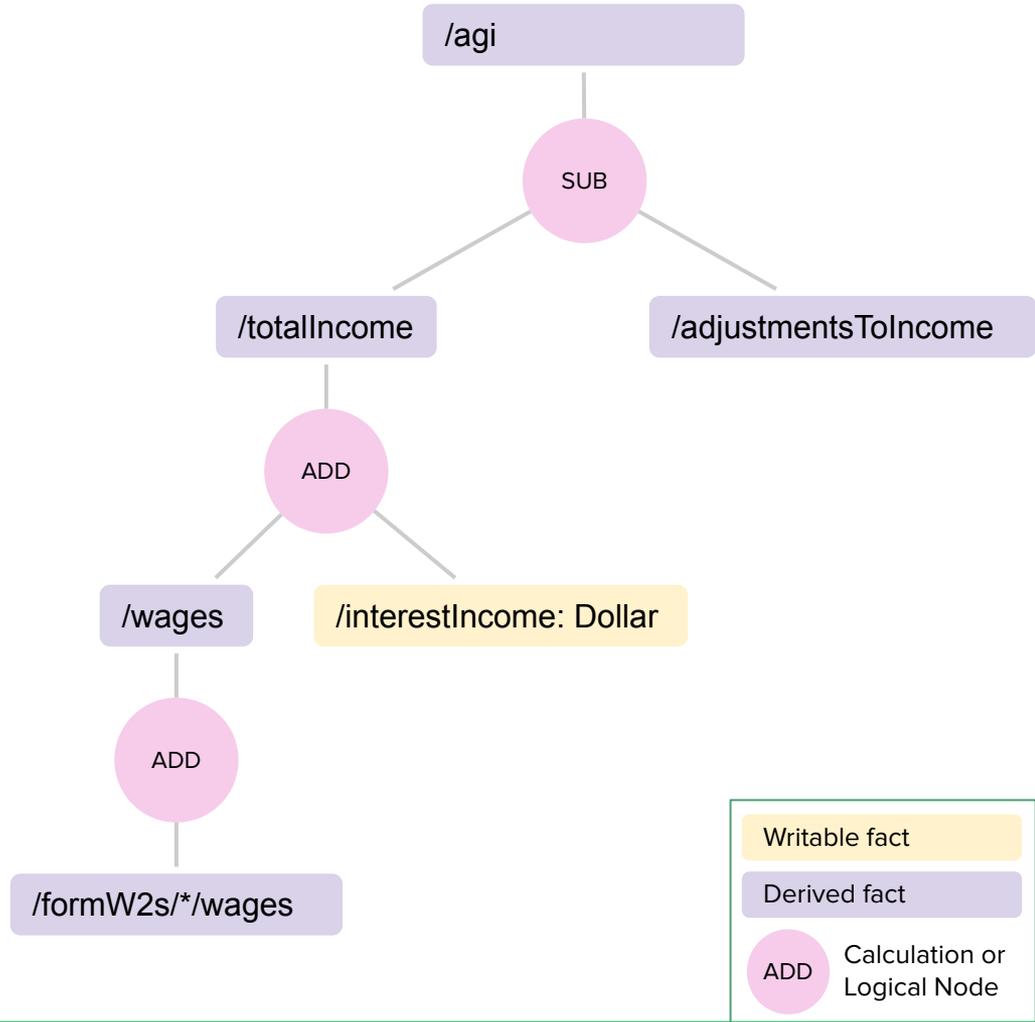
ty2022.xml:

```
<Fact path="/agi">
  <Name>Adjusted Gross Income</Name>
  <Description>
    Total income to report on line 11 of Form 1040.
  </Description>

  <Derived>
    <Subtract>
      <Minuend>
        <Dependency path="/totalIncome" />
      </Minuend>
      <Subtrahends>
        <Dependency path="/adjustmentsToIncome" />
      </Subtrahends>
    </Subtract>
  </Derived>
</Fact>
...
<Fact path="/interestIncome">
  <Name>Interest income</Name>
  <Description>
    Taxable interest income to report on line 2b
  </Description>

  <Writable>
    <Dollar />
  </Writable>
</Fact>
```

Human generated!



Collections are repeatable groupings of facts

```
<Fact path="/formW2s">
  <Name>Form W-2s</Name>
  <Description>
    Form W-2: Wage and Tax Statement, used to
    report wage income and withholding.
  </Description>

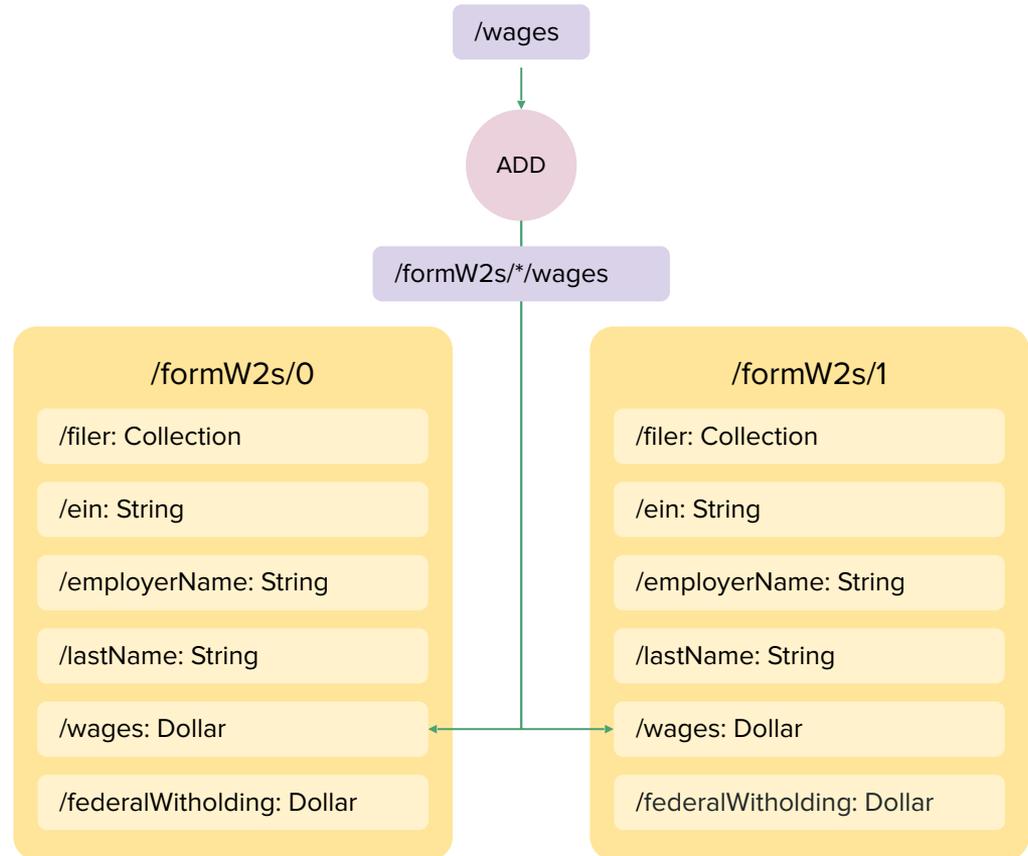
  <Writable>
    <Collection />
  </Writable>
</Fact>
```

```
<Fact path="/formW2s/*/filer">
  <Name>Employee</Name>
  <Description>
    The taxpayer who received the W-2.
  </Description>

  <Writable>
    <CollectionItem collection="/filers" />
  </Writable>
</Fact>
```

```
...
<Fact path="/formW2s/*/ein">
  <Name>Employer identification number</Name>
  <Description>
    Box b of Form W-2, employer identification
    number (EIN).
  </Description>

  <Writable>
    <String />
  </Writable>
</Fact>
```



Logic in the tax code

IRS Filing Statuses



Single: For people who aren't married, or who are divorced or legally separated.



Married filing jointly: For married people who want to file one return.



Married filing separately: For married people who want to file two separate returns.



Head of household: For unmarried people who maintain a household, with at least one qualifying person.

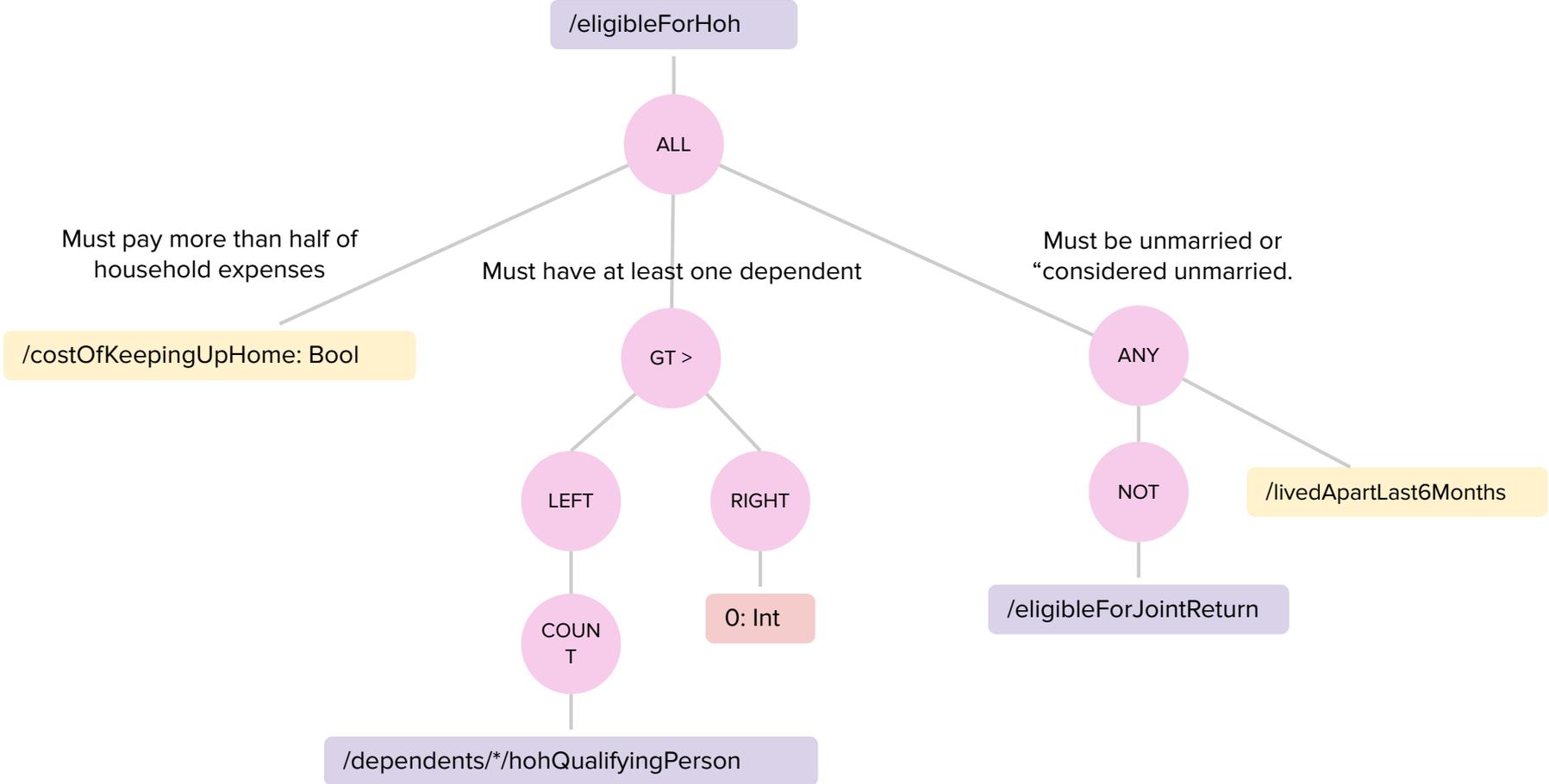


Qualifying widow(er): For people whose spouse died in the previous two years, and who have a qualifying child.

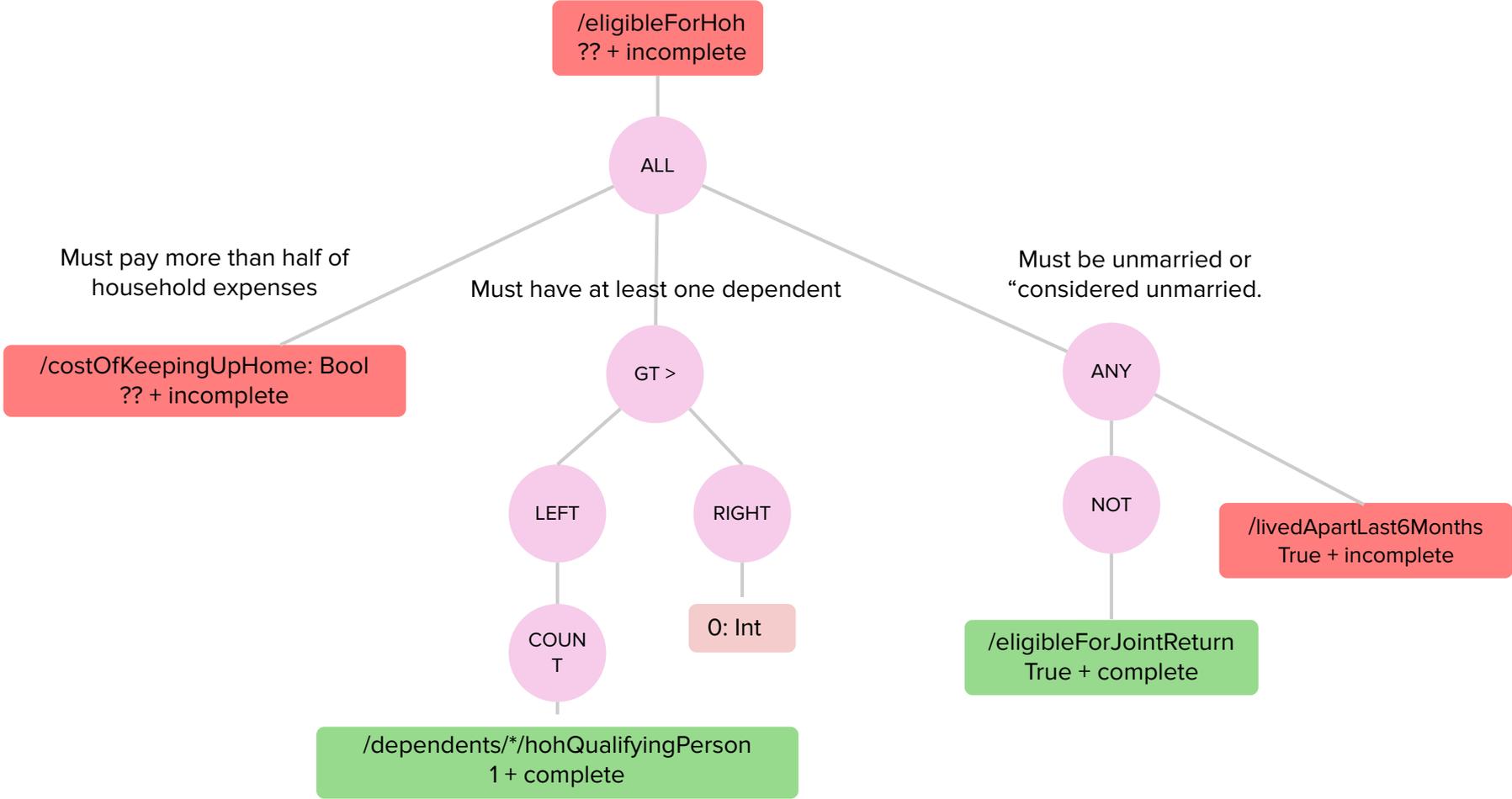
ALL of the following:

- Must pay more than half of household expenses
- Must have at least one dependent
- Must be unmarried or “considered unmarried.”

Logic represented in the FactGraph

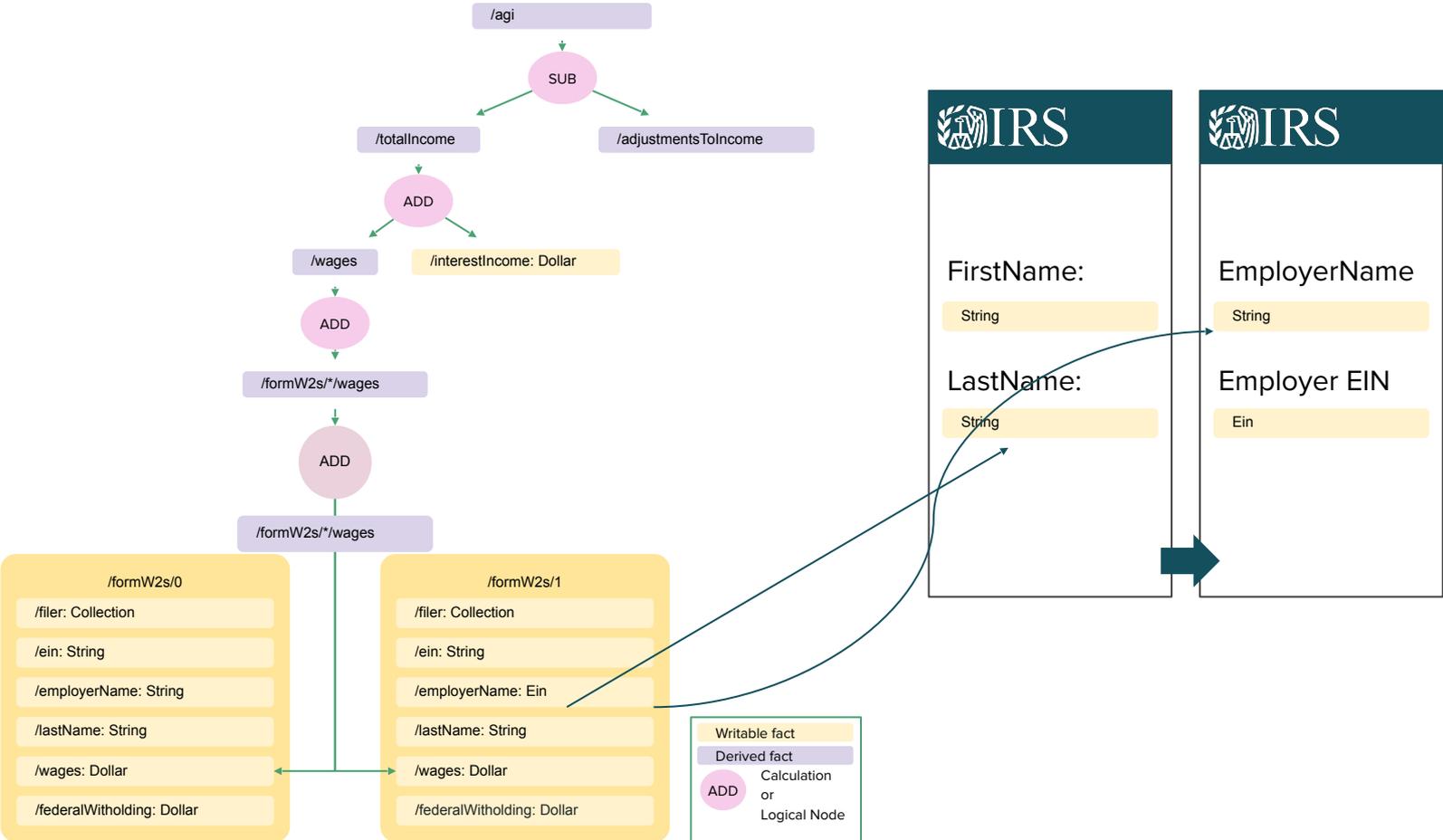


Completeness of facts



FactGraph to Question Flow

Writable facts need to be requested from the taxpayer



Flow.tsx is a sequence of screens requesting facts

Flow.tsx is a human generated representation of the flowchart of screens and questions.

- <Screen> represents each screen
- <InfoDisplay> is an information only component
- <Ein>, <Dollar> are all components pointing to writable facts.

Information requested from the taxpayer will be written to the associated fact.

As each writable fact is written, the fact graph can dynamically compute derived facts.

flow.tsx:

```
<CollectionLoop collection="/formW2s">
  <Screen route="about-w2">
    <Heading i18nKey="/heading/income/w2/about" />
  </Screen>
  <Screen route="employer-info">
    <Ein path="/formW2s/*/ein" />
    <GenericString path="/formW2s/*/employerName" />
  </Screen>
  <Screen route="wages">
    <Dollar path="/formW2s/*/wages" />
    <Dollar path="/formW2s/*/federalWithholding" />
    <Dollar path="/formW2s/*/oasdiWages" />
  </Screen>
</CollectionLoop>
```

/formW2s/0

/filer: Collection

/ein: Ein

/employerName: String

/lastName: String

/wages: Dollar

/federalWithholding: Dollar

Screen.tsx can dynamically generate screens from flow.tsx

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Check the information on your W-2 to make sure it's correct.

- Box a
Shows your correct Social Security number (SSN)
- Box e
Shows your correct name

Continue if box a and box e are both correct.

Continue

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Let's get your employer's info from box b and box c.

b - Employer identification number (EIN) Enter a 9-digit EIN

c - Employer's name

Save and Continue

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Add your wages and any taxes withheld from boxes 1-8.

Don't worry if some of these boxes are blank on your W-2. You don't have to enter an amount for every box.

1 - Wages, tips, other compensation

2 - Federal income tax withheld

3 - Social security wages

With help from translations!

flow.tsx:

```
<CollectionLoop collection="/formW2s">
  <Screen route="about-w2">
    <Heading i18nKey="/heading/income/w2/about" />
  </Screen>
  <Screen route="employer-info">
    <Ein path="/formW2s/*/ein" />
    <GenericString path="/formW2s/*/employerName" />
  </Screen>
  <Screen route="wages">
    <Heading i18nKey="/heading/income/add-wages" />
    <Dollar path="/formW2s/*/wages" />
    <Dollar path="/formW2s/*/federalWithholding" />
    <Dollar path="/formW2s/*/oasdiWages" />
  </Screen>
</CollectionLoop>
```

en.yaml:

```
headings:
  /heading/income/w2/about: Check the information on
  your W-2 to make sure it's correct.

  /heading/income/employer-info: Let's get your
  employer's info from box b and box c.

  /heading/income/add-wages: Add your wages and any
  taxes withheld from boxes 1-8.

info:
  /info/income/reset-return:
    body:
      - p : Don't worry if some of these boxes are
        blank on your W-2. You don't have to enter an amount
        for every box.
```

Gates and conditions let us skip screens!

Gates are used to indicate - only show these screens if this condition is true.

For e.g. if taxpayer selects single, they can skip questions related to marital status.

flow.tsx:

```
<Gate condition="/eligibleForJointReturn">
  <Screen route="live-together">
    <Boolean path="/livedApartMostOfYear" />
  </Screen>
  <Gate condition="/livedApartMostOfYear">
    <Screen route="live-apart-six-months">
      <Boolean path="/livedApartLastSixMonths" />
    </Screen>
    <Screen route="legally-separated-at-end-of-year">
      <Boolean path="/legallySeparated" />
    </Screen>
  </Gate>
</Gate>
```

SKIP IF NOT ELIGIBLE FOR JOINT RETURN

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What was your marital status on the last day of 2022?

Single
 Married
 Divorced or legally separated
 Widowed

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Did you and your spouse live apart for more than half the year in 2022?

Temporary absences for things like business, schooling, military service, vacation, or illness don't count as time apart.

Yes
 No

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Finished this section

Here's a quick summary

- Single

[Continue](#)



Putting it all together

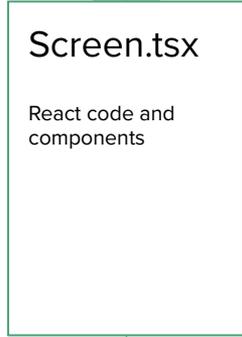
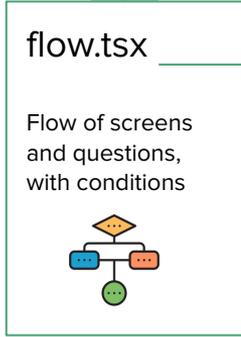
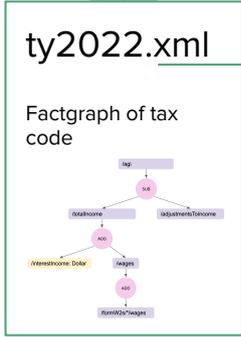
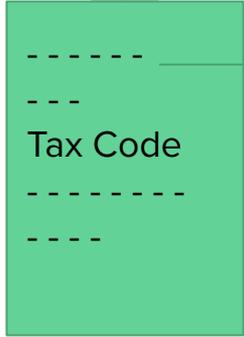
Represent the logic and calculations as a graph

Collect all the writable facts into a flow of screens & questions Gated by logic

Turn flow.tsx into dynamic generated screens and fields

Write facts back into Factgraph on each Save

Backend generates MeF xml format, Sends to IRS.



Check the information on your W-2 to make sure it's correct.

- Box a Shows your correct Social Security number (SSN)
- Box e Shows your correct name

Continue if box a and box e are both correct.

Continue

Let's get your employer's info from box b and box c.

b - Employer identification number (EIN) Enter a 9-digit EIN

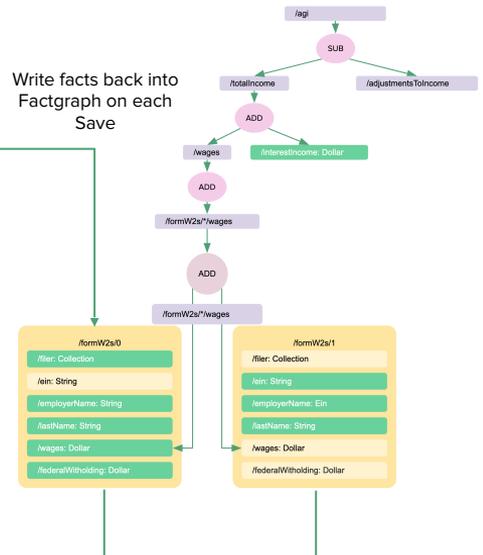
c - Employer's name

Save and Continue

Add your wages and any taxes withheld from boxes 1-8.

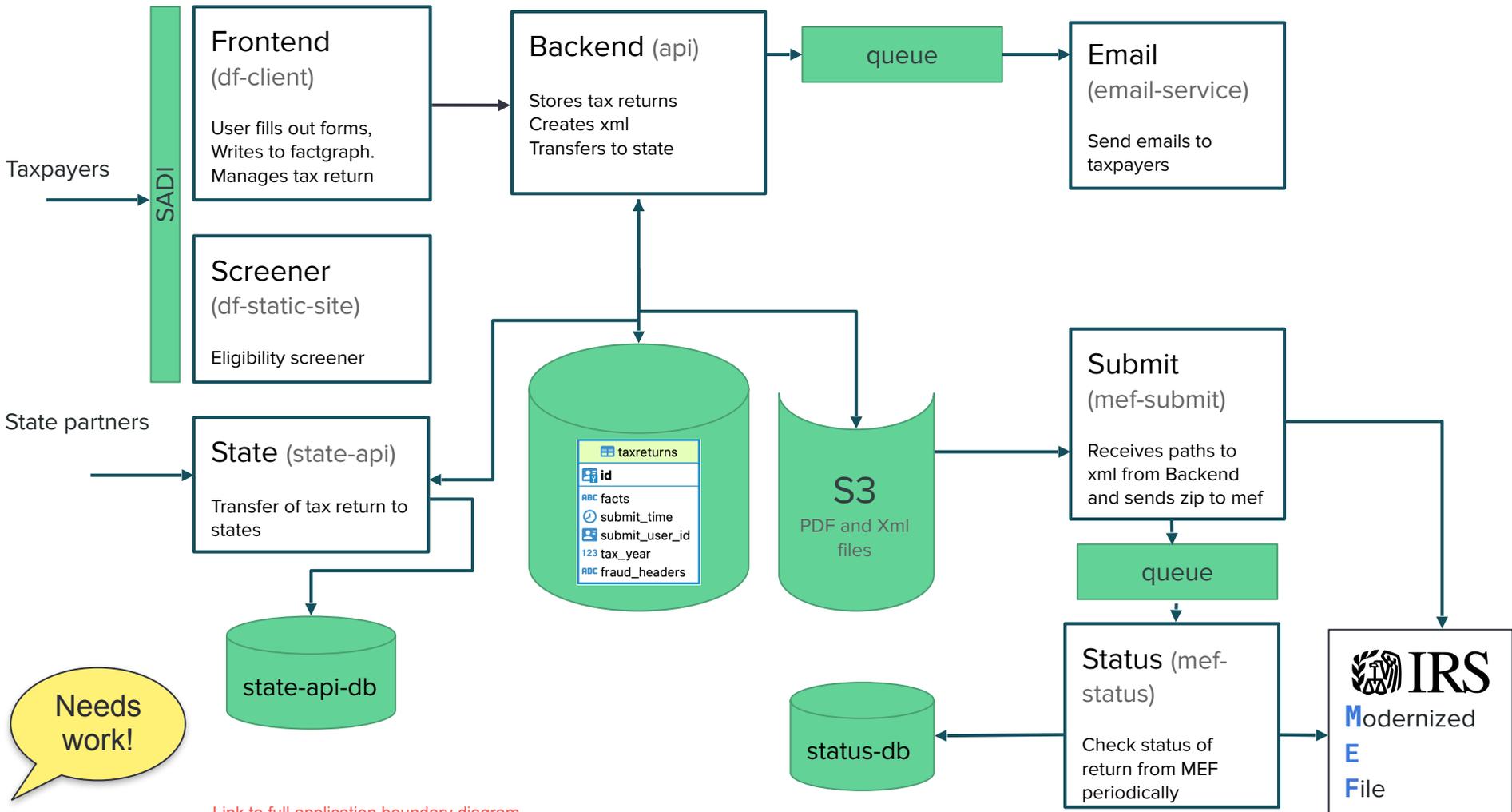
Don't worry if some of these boxes are blank on your W-2. You don't have to enter an amount for every box.

- Wages, tips, other compensation
- Federal income tax withheld
- Social security wages



Read facts to display on screen (even derived facts)





Needs work!

[Link to full application boundary diagram](#)