Problem statement: Ginger aims to provide care in each of the 50 US states. However, therapeutic care in the US requires clinicians to obtain state-level licenses to legally practice in a state. State governments are responsible for deciding what credentials practitioners must have to work in that state, as part of a process called "licensing". This creates significant friction because supply and demand for therapeutic care must reconcile at a state level and optimizing globally is all the more challenging. For a health care system that prides itself on access and availability, not being able to meet the demand can have negative business consequences (e.g. falling short of service-level agreements), while having superfluous supply represents additional costs and impacts profitability. There are several factors to consider:

- Therapists living in a given state are typically already licensed in that state.
- Each state exhibits different supply-demand equilibrium or imbalance, making it easier or more difficult to hire therapists.
- Therapists can get licensed to work in another state (i.e., such that they are able to provide teletherapy across state lines) although this process can sometimes take weeks or months, and has associated costs.
- It is also advantageous for therapists to be licensed in several states to provide flexibility in meeting punctual state-level demand fluctuations, generally creating more "liquidity" in the system or simply because a state doesn't have enough demand for a full-time
- Therapists can either be hired full-time by Ginger, or may be contracted to provide a minimum committed hours (sessions) per week.

Imagine that Ginger has access to data that allows forecasting per-state demand for its therapy services. Ginger has also identified states where it is easier or more difficult to hire therapist (think faster/slow rate of hire), and has historical data about the time required to obtain licenses on a per-state basis. Moreover, Ginger already has a workforce of hired and contracted therapist that are licensed in various states -- with some being licensed in up to 12 states!

Task: Describe how you would tackle building a model and optimization system that takes into account the various factors outlined above. The objective is to identify expected gaps in supply coverage and make recommendations as to where and how many therapist Ginger should hire or contract, and whether Ginger should proceed with licensing them in other states.

(Hint: this is ***not*** a forecasting problem, as we already have a demand forecast. This problem is more about supply-demand matching.)

Deliverable: A document (slides or text with diagrams) describing the approach, model(s), equations, tools such as languages, libraries, and possibly algorithms you would use to build a

system that can perform this task. We are interested in how you would implement your approach, highlighting working (even semi and non-working sketches) data models and algorithms in mathematical formulas or pseudocode is highly desired. We do not expect to see a working model in code.

The expectation is that you can present the approach to us in 20-30 minutes. Please send the project document in PDF format upon completion. After evaluating the project, we will schedule a presentation (via Zoom), with another 15 for follow-up questions.

Please state your assumptions clearly. This problem is meant to be open-ended with a view to helping us understand how you think and design systems. It is not about putting together the optimal or perfect model. We expect candidates to dedicate a *maximum* of 5 hours on this problem, no more. Be mindful of your own time.

Feel free to reach out with any questions if you feel there is any missing information.

(Please assume you are not using existing software that can solve this directly, if such application were to exist. The reuse of existing building-blocks such as programmable/customizable frameworks, is, of course, encouraged. Just not the use of a completely ready-made solution.)

Appendix - Data Samples

The following data samples are provided for illustration only. They are meant to help understanding of the problem statement, showcasing the type of data available, not to be used for verbatim analysis.

Therapist Details

Name	State(s) Licensed	Committed Hours per Week
Deanna Aburto	CA, FL, MT	30
Hung Helbing	WA, OK, OH,	20
Chester Hellen	CO, MN	20

Jaleesa Worthey	CO, WY	10
Min Elem	CA	40
...	...	

Demand Forecast

State	Expected Average Demand (hours/week)	Standard Deviation
CA	120	4.3
FL	40	8.1
OK	25	9.2
OH	90	8.0
WY	57	4.5
...	...	

Per-State Time-to-Hire

State	Average Time-to-Hire (days)
CA	45
FL	200
OK	125
OH	14
WY	90
...	...

Per-State Time-to-License

State	Approx. Average Time-to-License (days)
CA	35
FL	20

OK	15
OH	60
WY	35
...	...